

THE IRON AGE

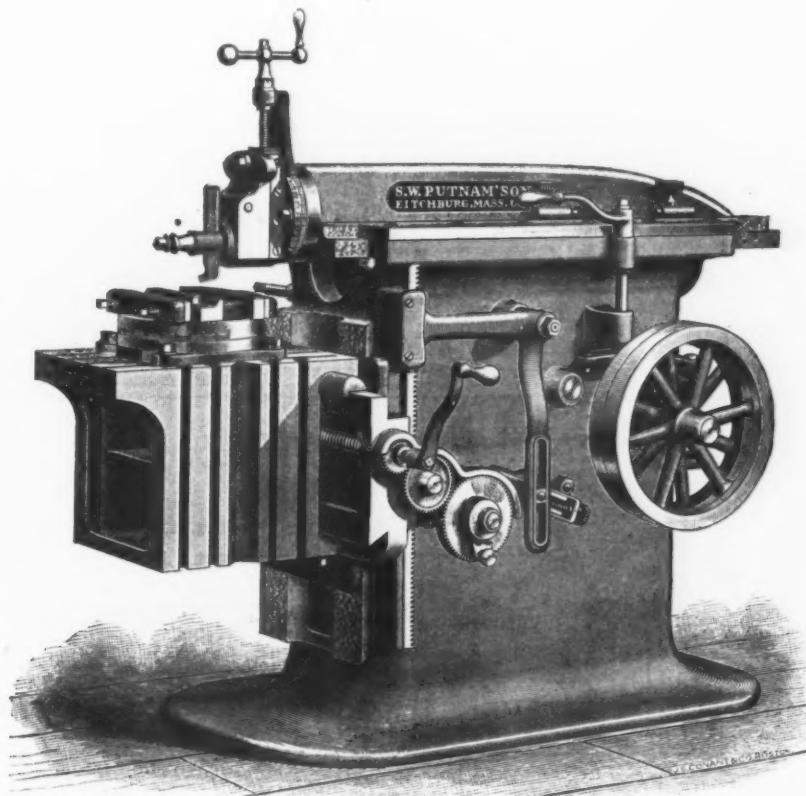
THURSDAY, FEBRUARY 28, 1889.

Shaping Machine.

The machine which we herewith illustrate in perspective and detail is compact and powerful, susceptible of fine and positive adjustments, practically noiseless, and operates with ease and smoothness. It is driven by straight and cross-belted friction pulleys located on each side of the machine. The power and velocity of the ram are unvaried by change of stroke, which can be regulated while the machine is in motion, its velocity at all times being uniform and under full control of the operator. By a new arrangement of motive parts the machine is self-adjusting as to wear and automatically absorbs power according to the resist-

quickness of the change in direction of the movement of the ram, which will work up to a line and reverse inside of $\frac{1}{2}$ inch. Shafting or bars of any length and up to $2\frac{1}{2}$ inches in diameter can be passed through the machine, under the ram and slotted or fluted at any point, and from $\frac{1}{2}$ to 15 inches in length, without change. The friction box for operating the feeds has a cam let-off and consumes power only at the instant of action. In the accompanying engravings, Fig. 2 is a side elevation showing the gears driving the ram and the feed gears, Fig. 3 is a plan view of Fig. 2, and Fig. 4 shows the construction of the driving shaft. This shaft consists practically of a hollow shaft, within which fits a spindle. To each end of the spin-

low shaft and being secured in the spindle. The spiral gear is thus free to move and to carry with it the inner shaft and also the driving pulleys P, mounted at either end of the inner shaft, and which are adapted to engage with the outer surfaces of the friction pulleys p. This spiral gear engages a gear connected with the driving train. These spirals are of 12° . It is evident from this construction that as the load upon the train increases the spiral gear J upon the shaft will be shifted along the shaft one way or the other, according to the direction in which the ram is moving, and will bring into play one or the other of the friction-wheels p. It is further evident that as the load increases the more powerful will be



SHAPER, BUILT BY THE PUTNAM MACHINE COMPANY OF FITCHBURG, MASS.

ance of the cutting tool—in other words, when the cut is exceptionally heavy and more power is consequently needed to drive the tool, it is obtained by means of an extremely simple arrangement, which we shall describe more in detail later. The ram is long, has a quick return, and is actuated by a powerful train of heavy gearing made in duplicate, the under surface of the ram being formed with two racks, with which the driving gears engage. The ram head is graduated, swivels on trunnion, is secured by T bolts to the ram, and has depth gauge, with a run of $5\frac{1}{2}$ inches. As stated, the driving gears are double, and so arranged that the cogs of one machine overlap the other. This imparts a smooth and even motion to the ram, and greatly promotes the endurance of the gears.

The machine has two speeds (for cast iron and steel), which admits of instant use without change of belt. Sufficient power is obtained to sustain a heavy cut, and an automatic coarse surfacing feed is provided. An important feature is the

idle is held a pulley, one of which operates the forward stroke of the ram and the other the return. The diameters are different, so as to get a quick speed on the return. Each pulley is mounted so as to revolve freely upon the hollow shaft, being held to the spindle by an arrangement shown in Fig. 5. Fitting a thread in the end of the spindle k is a nut, n, which holds the disk m in position. The hub o of the pulley is free to revolve on the hollow shaft. The hub is formed at its outer end with a thread, upon which fits the cap l, thereby forming an annular bearing about the disk m, so that while the pulley is free to revolve upon the hollow shaft, it is held in place by means of the disk m and the nut n to the spindle k. Fitting within the inner periphery of each pulley P is a friction pulley, p, mounted upon the hollow shaft with which it is rigidly connected. The spiral gear J is mounted about at the center of the driving shaft, and its extended hub is provided with a slot, j', through which passes a key, this key passing through a slot in the hol-

the thrust of the pinion J along the shaft, and the tighter will be the frictional hold between the pulleys p and P.

Fulcrumed at h, Fig. 3, on the side of the machine, is the lever H, the free end of which is formed with a yoke, as shown in the plan. In the free end of the yoke is pivoted a rod, the other end of which is provided with a standard having an arm adapted to engage with the usual tappets placed on top of the machine and carried by the ram. Pivoted a short distance from the fulcrum of the arm H is a rod extending through the case and carrying the friction arm, which is so arranged that any movement it makes in a direction parallel to the axis of its shaft will impart a similar movement to the spiral gear J. This arm, shown detached in Fig. 6, is of case-hardened malleable iron, and is provided with plugs of raw hide upon each side. As the ram moves forward its tappet strikes the upper projecting rod of the lever H and moves the rod entering the case, and therefore the spiral pinion

and its inner shaft or spindle, in a direction to throw out the driving pulley. At the reverse end of the stroke the mechanism takes the opposite course and

the lever H need be moved but a fraction to accomplish the movement of the spiral gear and the throwing out of the friction clutches. It is apparent that the heavier the

shaft to the ram and also to the feed mechanism, which latter is driven through the segmental arm B, thus engaging with the rack D, which drives the train E F G

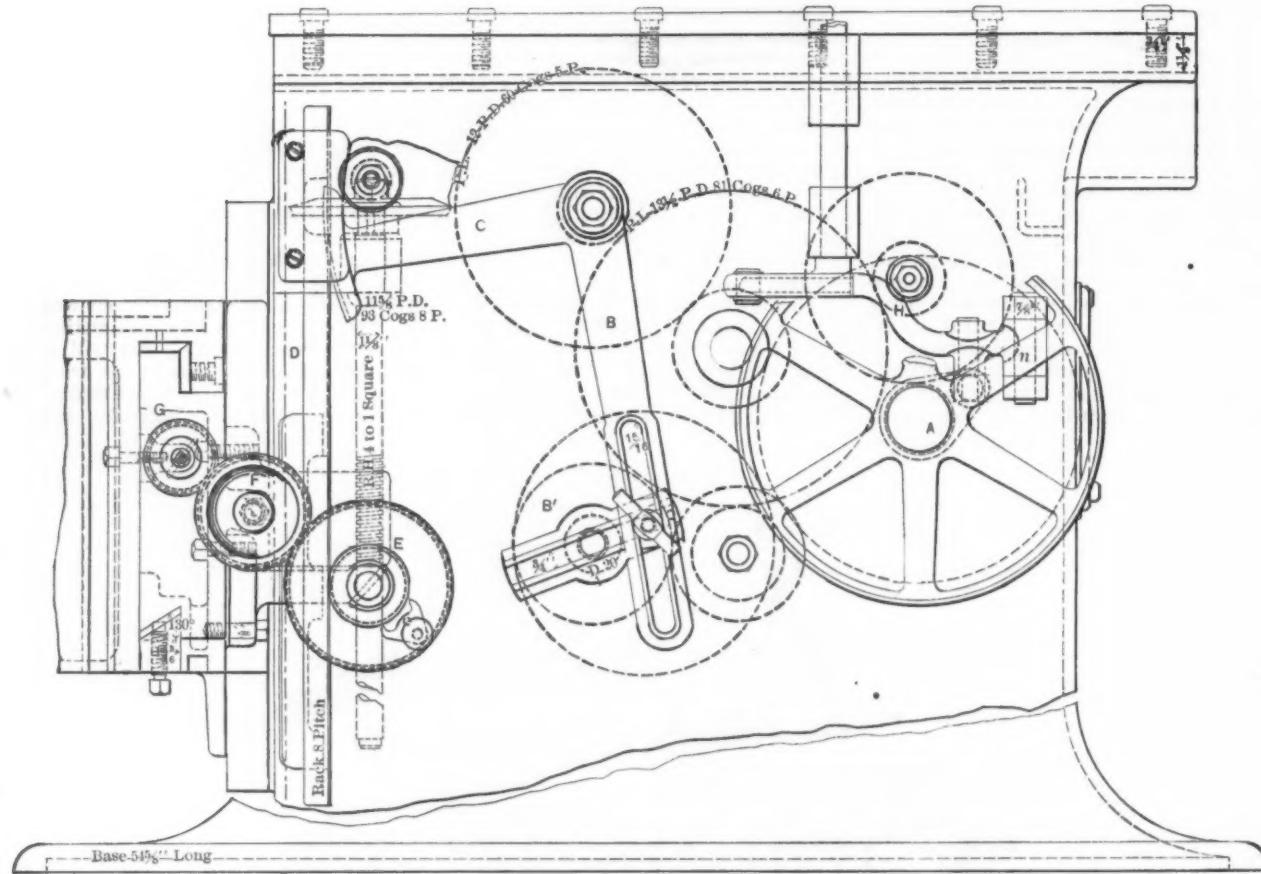


Fig. 2.—Side Elevation of Putnam Shaper.

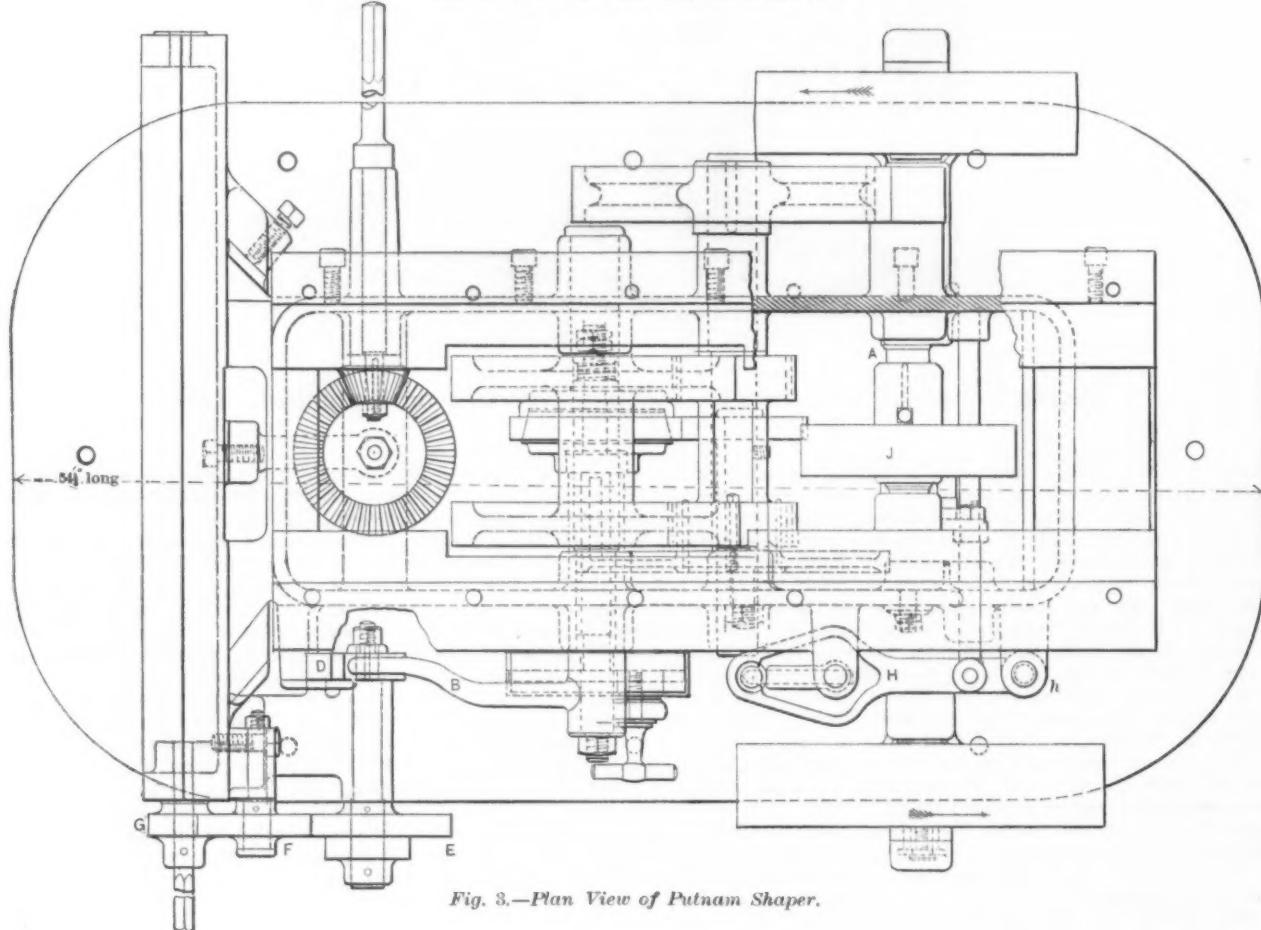


Fig. 3.—Plan View of Putnam Shaper.

relieves the friction from the pulley at the other end of the driving shaft. This mechanism permits of the working of the ram at an exceptionally short stroke, since

load the more powerful will be the force moving the spiral along the shaft and engaging the driving friction. In the side elevation, Fig. 2, are shown the trains from the driv-

ing the feed. The friction box operating this gearing consumes power only at the instant of action. From the brief description we have given of the

operating parts of this machine it will be seen that it is especially adapted for heavy work, that provision is made for compensating all wear of the frictional surfaces, and that it is so proportioned and designed as to work with the least possible time consumed by loss of stroke. The machine is unusually heavy and compact, and, possessing the admirable features we have mentioned, is rapidly making a place for itself in the long line of well-known tools coming from the Putnam shops. In an early issue we shall describe the rack-cutting attachment, designed to be used in connection with this shaper. This attachment can be placed on the shaper, with whose operation it will not in the least interfere, and at any time it can be used for the cutting of racks of any length. These

valued, as it is understood, at about or over \$1 per pound, is not the "steel strips" which pay 3½ cents per pound when valued at over 10 cents per pound, and 45 per cent. ad valorem when valued at under 4 cents per pound. This provision is evidently not applicable to such highly polished and finished merchandise as the article in question.

DUTY ON SWIVELS.

On an appeal from an assessment of 45 per cent. ad valorem on certain swivels, claimed to be dutiable under the provisions for "chain or chains of all kinds," the Department says: "The appraiser reports that the articles consist of a loop and swivel, having three or four short links of chain attached, and intended to be used, in connection with a leather strap, as a

still others four, strands of steel wire, also heavily covered with manila yarn, some of the latter being coated with tar and some not so coated. The merchandise not being the steel wire of commerce "covered with cotton, silk or other material," and not being the iron or steel wire rope also specified, and also being not otherwise enumerated, is dutiable at the rate of 45 per cent. ad valorem for "manufactures, articles or wares not specially enumerated or provided for * * * composed wholly or in part of * * * steel," &c., and the principle enunciated in the Department's decision, wherein it was held that certain "wire ribbon," which was a woven fabric consisting of fine wires covered with cotton thread and united together by a cotton web, was not the iron or steel wire covered with cotton, silk or

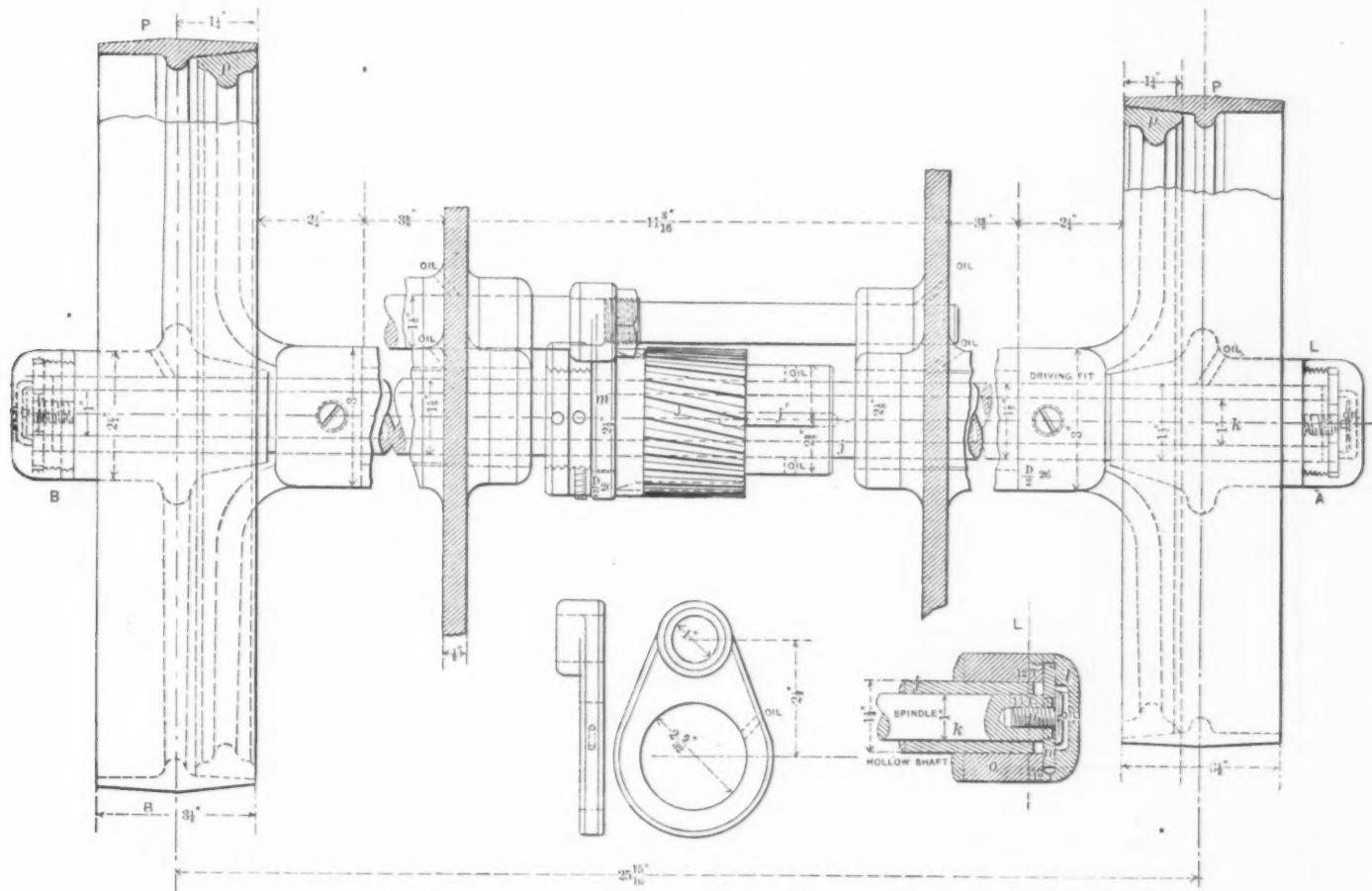


Fig. 4.

Fig. 6.

Fig. 5.

Figs. 4 to 6.—Driving Shaft of Putnam Shaper.

machines are built by the Putnam Machine Company, of Fitchburg, Mass.

Recent Customs Decisions.

The Secretary of the Treasury has announced the following decisions in customs cases under the metal schedule:

STEEL IN STRIPS.

The Treasury Department declines to reverse its decision whereby certain thin polished strips or tapes of steel were held to be dutiable at the rate of 45 per cent. ad valorem, for "steel not specially enumerated or provided for." From the statement, as well as that of the manufacturer, it was clear that the merchandise had, by the process of filing, polishing, &c., become, if not wholly, at least "partially," manufactured articles of steel, so that even if not covered by said provision it would be dutiable at the rate of 45 per cent. ad valorem. At any rate, the said merchandise, which, in many cases, is

patented article for fastening dogs, and that they are not, in his opinion, the 'chain' or 'chains' of commerce. From an examination of the sample submitted, the Department is of opinion that the articles are parts of chains, and that they were properly dutiable as claimed."

BUOY AND GRAPNEL ROPE.

On an assessment of duty at the rate of 45 per cent. ad valorem on certain so-called "steel wire covered with yarn," which the appellant claims to be dutiable at the rate of 6½ cents per pound, for steel wire galvanized, &c., the Department rules: "It appears from the report of the appraiser and an inspection of samples that the merchandise in question is not wire as commercially known and recognized, but that it consists of rope (styled by the appellant grapnel rope and buoy rope) composed of wire and manila yarn, some of the coils being composed of single pieces of galvanized steel wire heavily covered with manila yarn and coated with tar, and others containing three, and

other material as specified in said schedule.

DRAWBACK ON STEEL NAILS.

The Department in an application for drawback on certain steel nails has decided that on the exportation of steel nails manufactured wholly from imported steel slabs a drawback will be allowed equal in amount to the duty paid on the imported material used in the manufacture, less the legal retention of 10 per cent. The quantity of the material so used to be determined by adding to the net weight of the exported nails 7½ per cent. of such net weight.

Lord Stanley, Governor-General of Canada, advises that all Canadian fortifications be supplied with guns similar to those mounted in Halifax. So far from approving of this action, the Imperial Government, according to an Ottawa dispatch, remonstrates in imperative terms against the hostile policy pursued of late by the provincial authorities.

Pressure Regulator.

The safety pressure regulator here shown is especially designed for use in connection with a system for a public service of natural gas. It consists in a valve controlled and opened and closed by the shifting of a body of fluid which is moved by the pressure of the gas. The body of fluid is introduced into chambers, between which it is free to flow through the flexible pipe connecting them. The device is set so that under the average pressure of gas the fluid will be sustained in a state of about equal division between the two chambers; then, if the pressure drops a little in the outlet pipe, the pressure on the fluid will be proportionately relieved and enough fluid will gravitate from the movable chamber into the stationary chamber to sufficiently lighten the former to permit the weight to lift it, and hence the valve-arm, so as to open the valve wider and correct the variation in pressure by letting enough more gas pass the valve to make up. When, on the other hand, the pressure rises slightly above the average pressure, sufficient fluid will be forced from the stationary chamber to the movable chamber to pull the latter, and hence the valve-arm, down by the increase of weight in such chamber, and so close the valve enough to prevent increase of pressure and keep the amount of gas passing

gas-main and turning it on again without the consumer's knowledge. In case there should be a dangerous overpressure of gas, the entire amount of fluid will be forced into the movable chamber, which will then overbalance the weight and pull down the valve-arm so as to entirely close the valve. But as the pressure reduces, the fluid will flow back into the stationary chamber and permit the weight to lift the movable chamber and arm, and thus automatically open the valve. The regulator has therefore the three-fold function of compensating for variations of pressure in the ordinary use of the gas, in shutting off the gas so that it must be turned again personally by the consumer when it is turned off in the main line, and, also, in shutting it off entirely when the pressure is so excessive as to be dangerous or inconvenient. The arrangement of passages and connections is such that no fluid can remain in them, thus giving absolute freedom from frost. Owing to the parts being all of metal, the operation is no more affected by fire than are the pipes or connections. This regulator is being made by Adams Bros. & Co., of Findlay, Ohio.

Exhibitors at Paris.

The efforts of the American Commissioners of the Paris Exposition appear to have led to success, the number of manu-

Ohio; Union Metallic Cartridge Company, New York; Winchester Repeating Arms Company, New Haven, Conn.

Boilers.—E. P. Brown, Flushing, N. Y.; Hopson & Chapin Mfg. Company, New London, Conn.

Drills.—American Diamond Rock Boring Company, New York; Ingersoll Rock Drill Company, New York.

Carpenters' Tools.—Darling, Brown & Sharpe, rules, &c., Providence, R. I.; E. E. Gaylord, saws, planes, &c., Bridgeport, Conn.

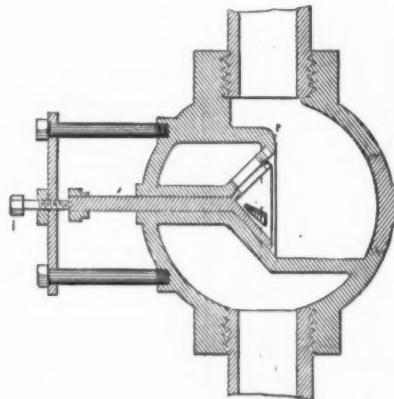
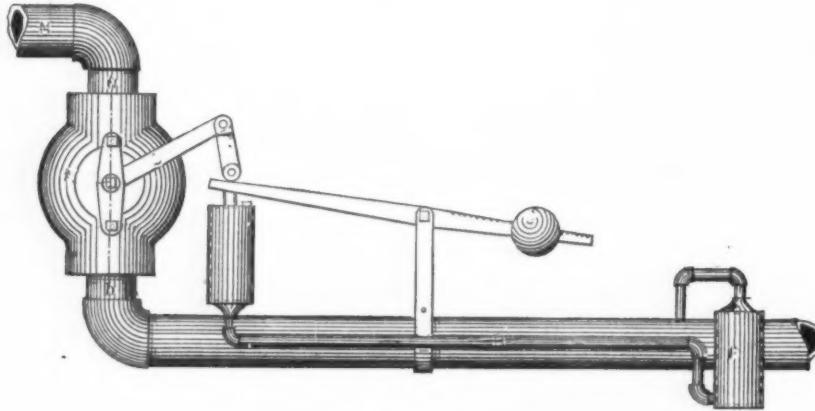
Engines.—John Henry Blake, marine rotary, New York; Crist & Covert, gas, New York; N. Huntley Edgerton, Philadelphia; J. Willis Morris, New York; Simonds Manufacturing Company, New York; Straight Line Engine Company, Syracuse, N. Y.; George W. Tift Sons & Co., automatic, Buffalo.

Glues.—Le Page & Co., Boston; Mrs. Cristine Lugano, Kingston, N. Y.; Russia Cement Company, Gloucester, Mass.

Hardware.—Stanley Works, New Britain, Conn.; L. & J. White, tools and knives, Buffalo, N. Y.

Road Machines.—American Road Machine Company, Kennett Square, Pa.; Brooklyn Railway Supply Company, New York; Gendron Iron Wheel Company, Toledo, Ohio; George N. Pierce & Co., Buffalo.

Railway Supplies.—D. E. Bishop, railroad joint, New York; Henry Bornstein & Co., patent pin hook, Boston; William H. Inloes, model of turntable, Asheville, N. C.; Dr. B. F. Laird, car coupling, Covington, Ky.; New York Car Wheel Works, Buffalo, N. Y.; New York Commercial Company, New York; Peckham Paper Car Wheel Company, New York; H. K. Porter & Co., Pittsburgh; John Stephenson Company, New York; A. Whitney & Sons, car wheels, Philadelphia.



RYDER PRESSURE REGULATOR, MADE BY ADAMS BROS. & CO., OF FINDLAY, OHIO.

into the outlet pipe nearly constant. It will be seen that the fluctuations in pressure in the gas supply at once act through the movable fluid to operate the valve in compensatory action, so that although variations of pressure occur in the gas main, the pressure of gas passing through the outlet pipe will be constant. In case the gas should be entirely shut off in the gas main, all the fluid will then at once gravitate into the stationary chamber, leaving the movable chamber so light that it is overbalanced by the weight and lifted until the valve-arm rotates the valve so as to entirely close it. It will thus be seen that the shutting off of the gas in the gas-main is followed by the automatic closing of the valve. The regulator acts as a visual indicator to signal to the consumer that the gas has been shut off in the main line. Now, although the gas may be turned on in the main line, none will pass into the outlet pipe until the consumer has manually opened the valve by lifting the weighted lever, which he must hold in an elevated position against the weight until the pressure of the gas thus let into the outlet pipe, and hence into the stationary chamber, has forced enough liquid into the movable chamber to balance the weight and keep the valve open. It will be evident from the foregoing that the device constitutes a safeguard against accident due to shutting off the gas in the

facturers to whom space is allotted being very large. The commissioners have assured exhibitors that every possible care will be taken to display to the best advantage whatever may be sent. There will be no expense for freight charges either going to France or returning, but exhibitors are expected to provide packing for their goods, and to attach to the various exhibits cards stating the insurable value of the goods. They must agree also not to offer any of the exhibits for sale during the progress of the exhibition, and not to withdraw any of them during that time. Space has been allotted thus far to the following firms:

Agricultural.—S. L. Allen & Co., seed drills, Philadelphia; Egbert Benson, cultivator, Raritan, N. J.; Columbia Agricultural Works, Columbia, Pa.; Cyclone Pulverizer Company, New York; Enterprise Mfg. Company, feed grinders, Columbian, Ohio; Genesee Valley Mfg. Company, drill, corn-sheller, &c., Mount Morris, N. Y.; Higganum Mfg. Corporation, Higganum, Conn.; J. Moore's Son, rakes and forks, New York; Thornton N. Motley, wheelbarrows, New York; A. G. Peck & Co., axes, Cohoes, N. Y.; Strickler Brothers & Co., butter coloring, Sterling, Ill.

Ammunition, Cannon, Guns, &c.—Bailey, Farrell & Co., Pittsburgh, Pa.; E. P. Brown, Flushing, N. Y.; Colt's Patent Firearms Mfg. Company, Hartford, Conn.; Hurst Reinforced Cartridge and Arms Company, Washington, D. C.; Pneumatic Dynamic Gun Company, New York; Smith & Wesson, Springfield, Mass.; Standard Target Company, Cleveland

Mill Machinery.—Brown & Sharpe Mfg. Company, Providence, R. I.; Curtis & Curtis, Bridgeport, Conn.; A. Heine, Silver Creek, N. Y.; Higley Sawing and Drilling Machine Company, Boston; E. Horton, Son & Co., Windsor Locks, Conn.; Simeon Howes, Silver Creek, N. Y.; Klaunder & Bro., Philadelphia; F. W. Leinbach, Bethlehem, Pa.; V. W. Mason & Co., Providence, R. I.; William Sellers & Co., Philadelphia; D. E. Whitton Machinery Company, New London, Conn.

Mowing Machines.—Bradley & Co., Syracuse, N. Y.; Samuel Johnston & Co., Brockport, N. Y.; McCormick Harvesting Company, Chicago; D. M. Osborn & Co., Auburn, N. Y.

Harvesters.—Johnston Harvester Company, Batavia, N. Y.; Pland Mfg. Company, Chicago; Walter A. Wood Company, Hoosick Falls, N. Y.; William N. Whitley Company, Springfield, Ohio.

Stoves, Ovens, &c.—McDowell Oven and Furnace Company, Boston; A. Reid, Buffalo.

Machinery Aids.—American Bit-Brace Company, Buffalo; A. Christoffel, boiler tube scraper, Brooklyn; F. S. Pease, lubricating oils, Buffalo.

Machinery of Various Kinds.—Wilson Ayer, rice machines, Camden, N. J.; Burton Flis, emery wheels, Paris; Chambers Brothers, brick-temping machine, Philadelphia; J. H. Eaton, plater for dress trimming, Monroe, Wis.; Energy Manufacturing Company, rope hoists, Philadelphia; J. D. C. Knapp, vaporizers, Minneapolis, Minn.; Michigan Radiator and Iron Mfg. Company, Detroit, Mich.; W. E. Morgan, numerating machines, Chicago; T. W. Norman, rope-laying machine, Boston; John E. Smith, machine for cutting meat, Buffalo; Stiles & Parker, drop hammers, Middletown, Conn.; Teal Hoist Company, patent hoists, Philadelphia.

Machinery Packings.—United States Metallic Packing Company, Philadelphia.

Mechanics' Tools.—Billings Spence Company, Hartford, Conn.; L. S. Starrett, Athol, Mass.

Locks.—Miller Lock Company, Pahita, Pa.; Yale and Towne Mfg. Company, post-office outfit, Stamford, Conn.

Laundry Machines.—Bailey Wringing Machine Company, Woonsocket, R. I.; Charles A. Bentzen, New York; A. M. Dolph Company, New York; Empire Granite Company, New York; Empire Wringing Company, Auburn, N. Y.; Gowans & Stover, Buffalo; D. K. Hickok, Morrisville, Vt.; C. Mears & Son, Bloomsburg, Pa.

Lawn Mowers.—Chadborn & Coldwell Mfg. Company, Newburg, N. Y.; Lloyd Hardware Company, Philadelphia.

Leather Goods and Belting.—American Leather Link Belting Company, New York;

Riveting Machines.

The gradual advance in forging, from the old sledge wielded by brawny arms to the power and steam hammer of to-day, is well known to every manufacturer, but until 25 years ago little advance had been made over riveting by hand; drop and foot presses have been tried, but the force of the blow expanded the rivet the whole length. The inventor of the machine here illustrated then became convinced that the best results could only be attained by a succession of sharp, quick blows given in the least possible time. After considerable experimenting the principles embodied in this machine were adopted, and

stantly. The blow is rendered elastic by the springs in connection with the air-cushions, and its force can be regulated at the will of the operator by more or less pressure applied to the treadle at the right of the machine; the yoke to which the treadle is attached is self-acting, and the moment the pressure is removed the blows cease and the work can be withdrawn. Suitable devices for holding the work firmly can be attached to the adjustable anvil and connected with the treadle at the left of the machine, so as to be operated by foot if desired. The work being held firmly on the anvil directly under the hammer, the hammer always strikes on the rivet, heading it equally, and as it is rotated while the blows are being struck the head conforms to the shape of the pein of the hammer, and any style of head can be formed. Both hands of the operator being free, he is able to handle the work with ease and rapidity.

Fig. 1 represents the form of machine generally used, and is adapted to all ordinary work, but where more room is required between the anvil and the hammer the base of the machine is changed, as shown in Fig. 2, and can be furnished in various heights with a detachable anvil. When made for agricultural wheels or articles of that height it will answer for all classes of work, but is not recommended for continuous use in general riveting, as the pein of the hammer is so high that the operator must work on a platform in order to be on a level with the hammer, which necessitates raising all of his work to the same height. In Fig. 2 no treadle is shown to operate attachments on the anvil, but when required it will be furnished. In riveting the hubs of wheels or larger articles where much horizontal room is required a machine embodying the upper working parts only can be furnished, and this suspended by a framework from the ceiling will allow of riveting on the surface of work of any diameter.

The machines are made by John Adt & Son, New Haven, Conn., in six sizes—viz., $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch, each machine being capable of working rivets of the diameter given and many sizes smaller.

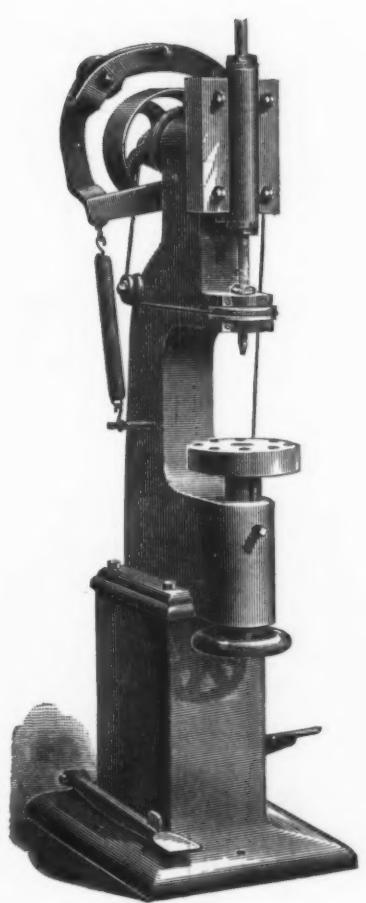


Fig. 1.

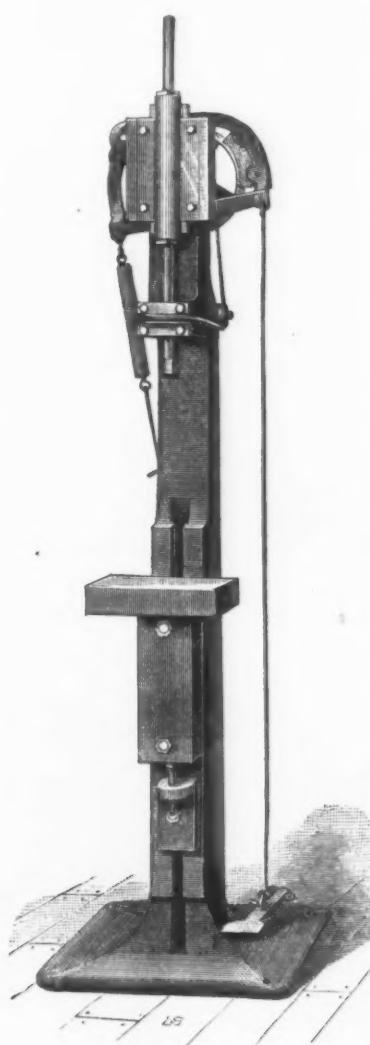


Fig. 2.

RIVETING MACHINES BUILT BY JOHN ADT & SON, OF NEW HAVEN, CONN.

R. Hoffeld & Co., Buffalo, N. Y.; Leopold L. Lowenheim, New York; F. Osborn, Jr., & Co., Boston; George H. Russell, Newburg, N. Y.; R. G. Salomon, Newark, N. J.; Charles A. Schieren & Co., New York.

Household Utensils.—H. M. Dopp & Son, iron kettles, Buffalo; F. A. Frank, cook stove, New York; George A. Macbeth & Co., lamp chimneys, Pittsburgh; Kellogg & McDougall, brooms, Buffalo; Joseph Noyes & Co., clothes fasteners, Binghamton, N. Y.; Henry Nutrizio, coffee pots, New York; W. H. Pike, self-pouring teapot, New York; A. H. Reid, butter worker, Philadelphia; Sidney Shepard & Co., sifter, knife, &c., Buffalo, N. Y.

Hydraulic Rams, Pumps, &c.—W. B. Douglas, Middletown, Conn.; Silver & Deming Mfg. Company, Salem, Ohio; Worthington Pumping Engine Company, New York.

Nails.—Ausible Horse Nail Company, New York.

Secretary Whitney has given the new dynamite gun the stamp of his official approbation, the recorded result of tests made being pronounced satisfactory.

although many changes and improvements have been made, machines that were then manufactured and which have been in continuous use for over 20 years are still doing the work satisfactorily.

The elastic rotary-blow riveting machine, Fig. 1, was originally designed to rivet together articles of hardware, but its use has from time to time been extended to almost every branch of manufacturing where articles are held together by rivets, and it is now widely used in establishments where its utility has become known.

The most important feature of the machine is in the combination and working of the cylinder and hammer-rod. The hammer-rod, suspended by springs and confined air within the cylinder, partakes of its reciprocating motion and produces a sharp, quick blow, which with its rotating action enables the machine to perform the work almost in-

The freight agents at Pittsburgh of the various lines having connections with that city have been at work for some time on a new form of freight tariff, which will prove a great advantage to shippers when wanting information in regard to the rate to any point mentioned in the tariff. At present the rate is given with the name of each point of shipment, thus requiring a vast amount of unnecessary repetition. To find the rate it is necessary to refer to the index to find the page in the tariff list. The new form does away with an index entirely. The name of each place to which merchandise is shipped from Pittsburgh is given in alphabetical order. For instance, if the rate on any class of merchandise from that city to Chicago is wanted, by reference to the alphabetical list the name of the road over which the goods will be shipped is given, and also the number of that city, which is 100. All that is then necessary to find the rate is to refer to the table of rates, which is printed on one page. The simplicity of the new form can be seen at a glance by reference to the following illustration, taking Chicago as an example:

Chicago, Ill. | L. S. M. S. | 100
This shows the city, State, railroad over which merchandise can be shipped, and the number for the table of rates. The table of rates is illustrated as follows:

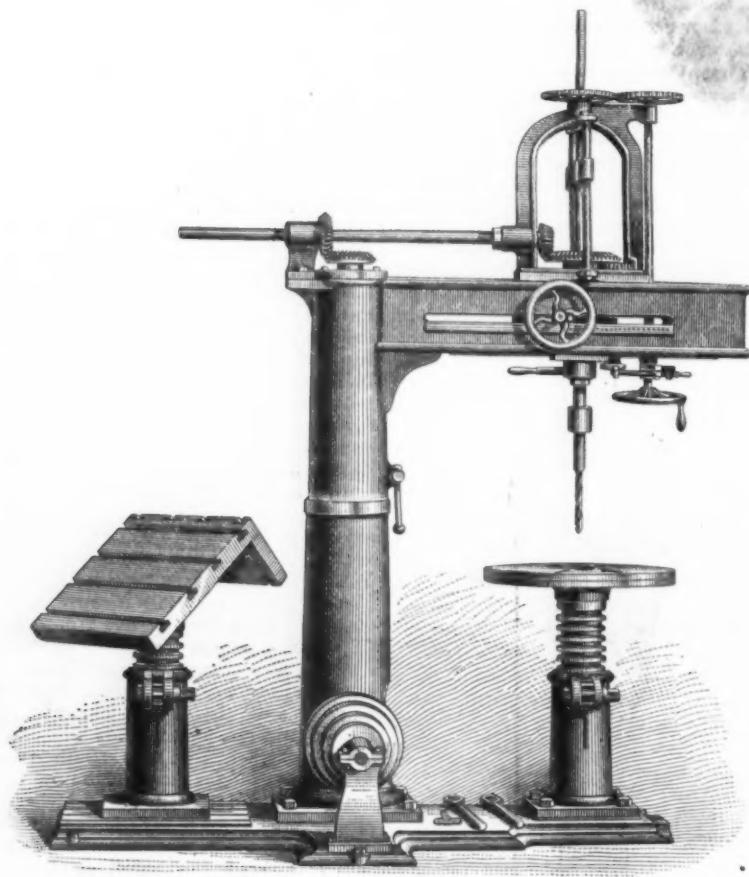
No. 100.	1	2	3	4	5	6
	42 $\frac{1}{4}$	37 $\frac{1}{4}$	27 $\frac{1}{4}$	20	17 $\frac{1}{4}$	15

The number 100 indicates the city, the top line of figures shows the various classi-

fications of freight, and the lower line of figures shows the rates per 100 pounds on the different classes of freight. This new

tached to the vertical shaft G' , whose lower end is provided with a hand-wheel, G^* . The cross-head H , which moves upon

threads on the lower end of the feed-screw are much finer than those on the body of the screw. Beneath the recess h



THE KEYSTONE RADIAL DRILL.—PRENTISS TOOL & SUPPLY CO.,
NEW YORK.

form of freight tariff will be put in operation some time during the early part of next month.

The Keystone Radial Drill.

This drill is intended for a large range of work. It will take in a pulley up to 4 feet in diameter, and will bore small cylinders and similar work. The screw will feed 14 inches, and has adjustable automatic feed. The circular table is 24 inches in diameter, and is bored to receive bushes for boring bars; it can be raised or lowered without being turned around. The square tilting table slips in the slotted side of the bed and can be quickly removed. The drill illustrated has a radius of 48 inches and will drill to the center of an 80-inch circle. The column is 12 inches in diameter and 6 feet high.

Fig. 2 of the drawings is a side view and Fig. 3 a vertical section of the drill-stock; Fig. 4 is a side view and Fig. 5 a sectional view of the tilting table and its support. Through the horizontal slot in the beam passes a shaft carrying a pinion and hand-wheel engaging with a rack so as to move the drill frame. The drill spindle is revolved from the cone pulley by gearing inclosed within the column and at the top of the beam, as shown in the perspective view. The drill frame is formed with laterally-projecting arms, E E , connected together by guide-rods. At the center of these arms are openings, in the lower one of which is journaled the hub of the beveled gear D' , while in the upper opening is seated an internal screw-threaded feed-nut, F , with which the feed-screw G engages. To the upper portion of the feed-nut is secured the pinion g , engaging with which is the gear g' at-

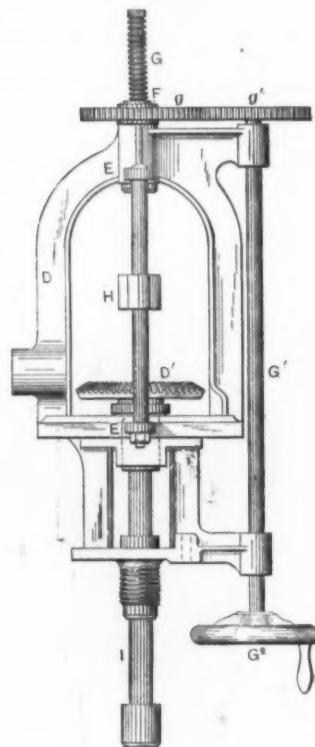


Fig. 2.

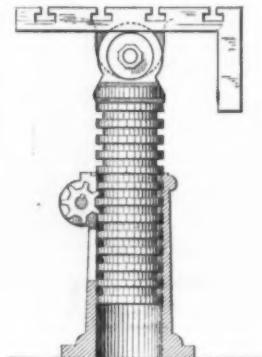


Fig. 5.

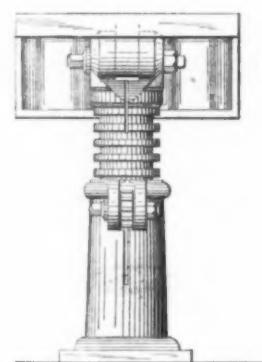


Fig. 4.

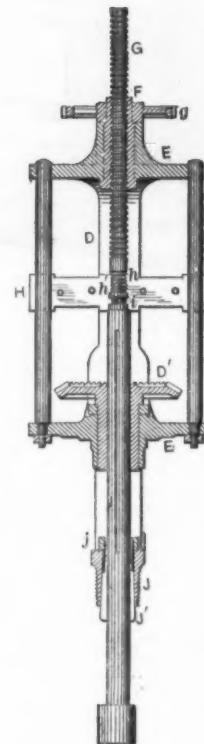


Fig. 3.

the guide-rods, has a central threaded and communicating with it is a recess l socket, h , with which the lower end of the feed-screw g is formed with an annular shoulder to engage a groove on the upper end of the spindle

I, which passes freely through the pinion D' to which it is splined. The lower cross-piece of the drill frame has a vertical conical socket, J, within which is seated a long split sleeve J', threaded at its upper end to receive the adjusting nut j. This sleeve forms the lower bearing for the spindle and may be adjusted vertically within its socket by means of the nut to take up wear. By supporting the spindle in this way the weight of the spindle and its parts does not come upon the drill, and drills of the smallest kind may be used without danger of breaking.

At one end of the platform of the drill is a stationary column carrying a vertically movable table which is rigidly at-

New Power Forging Drop Press.

The accompanying illustrations represent a new drop power forging press put upon the market by the E. W. Bliss Company, Brooklyn, N. Y. Fig. 1 shows the general appearance of this press, while Fig. 2 is a cross-section of the lifting device. The same concern are also just putting upon the market a similar press for sheet-metal stamping work, in which the gripping device is the same as in the forging press. As the two machines embody the same general features of construction, a description of one of them will suffice. The tool is a departure from the familiar types, in the direction of simplicity and

cessity of gearing. As no bolts or screw-threads are used in the construction of the lifter, there is nothing to jar loose. The only bolts used on the entire machine are those shown for securing the guides to the bed, and the nuts for these are placed in cored pockets in the bed and bear upon rubber washers. Several sizes of these tools are now in course of construction, the hammers weighing from 100 to 1000 pounds. The size represented in the cut has a 350-pound hammer, with 26-inch lift; complete weight, 4500 pounds.

One of the most remarkable engineering feats appears to have been achieved in China, in the face of extraordinary phys-

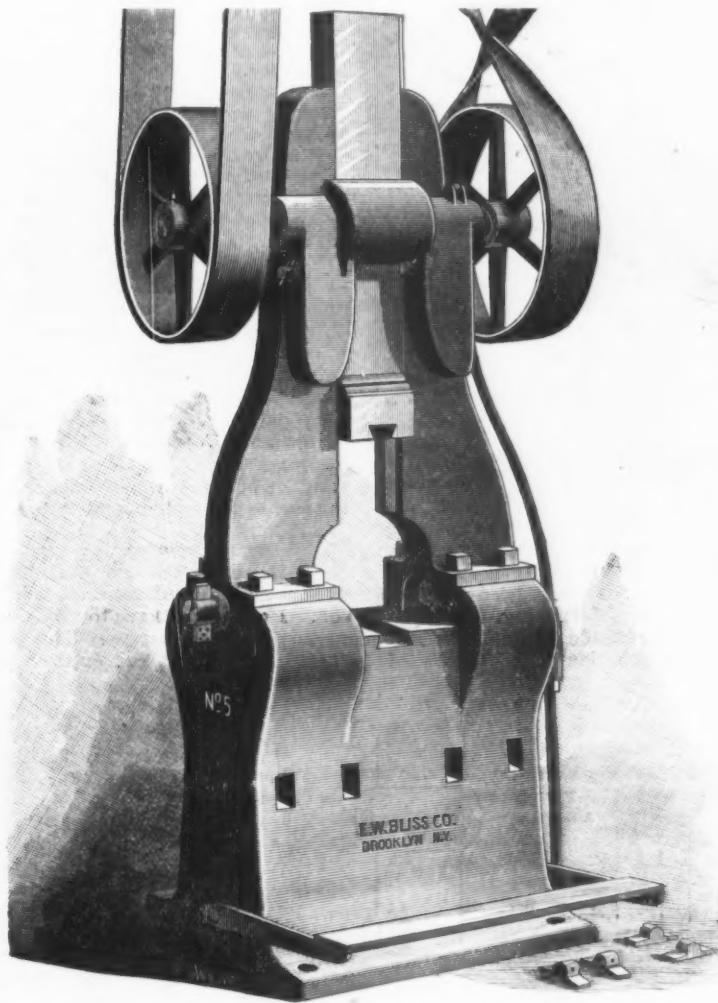


Fig. 1.—General View.

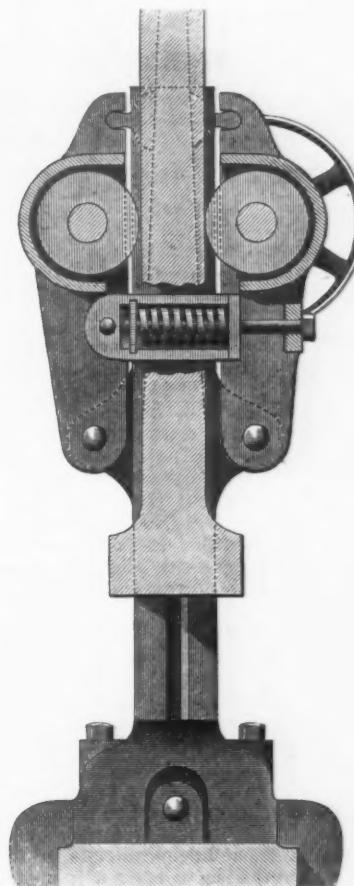


Fig. 2.—Sectional View, Showing Lifting Device

FORGING DROP PRESS, BUILT BY THE E. W. BLISS COMPANY, OF BROOKLYN, N. Y.

tached to a column having horizontal grooves with which engages a pinion carried by the outer column. The table can be adjusted vertically and turned horizontally. A second column, Figs. 4 and 5, may be moved toward or from the first and clamped in any desired position. The construction of this column is clearly shown in the drawings. The table can be raised to any height and adjusted to any desired angle.

This drill is built by the Prentiss Tool and Supply Company of 42 Dey street, New York.

Charles Pratt, the wealthy oil manufacturer of Brooklyn, on Friday, 22d inst., formally presented to Adelphi Academy the new wing to be known as the Collegiate Building, which has been erected at a cost of \$160,000. It is fireproof throughout.

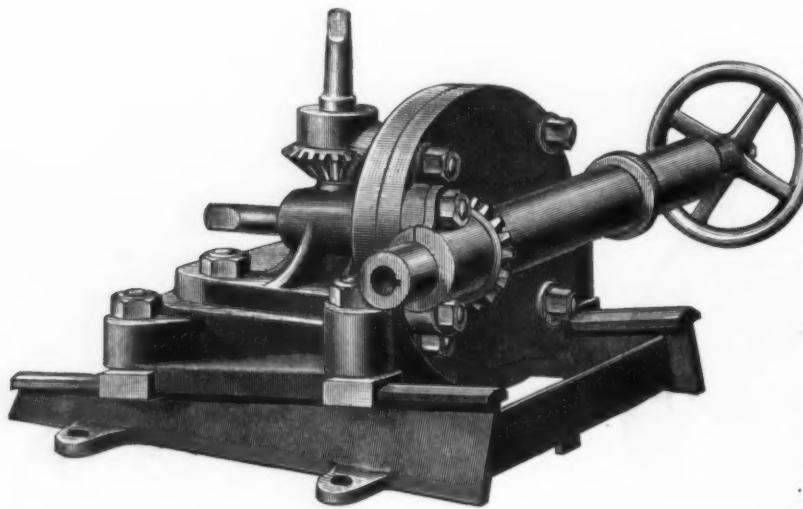
small number of parts, and in order to fully test its merits and discover possible defects before offering it for sale, it has been run continuously for about six months in making drop forgings. This test has led to a few minor changes, the final result being embodied in the machine as illustrated. The principal feature is the peculiar shape of the hammer, which is essentially nothing more than a steel billet placed on end and hammered out at the bottom to give proper support to the die. This construction concentrates the blow upon the work, gives very long guides for the hammer, and makes a very strong and durable arrangement. The lifting rolls are carried in housings, as shown, and work directly against the face of the hammer, and the details are so arranged that no adjustments on account of wear are necessary. Each roll is driven by an independent pulley, thus avoiding the ne-

ical difficulties—namely, the successful stretching of a steel wire cable of seven strands across the river Lunann, this feat having been accomplished by the Danish engineer Delinde, assisted only by unskilled native labor. The cable extends between two points, at a distance of nearly 4700 feet apart, the height of the first support being about 450 feet above the present level of the river, and the second about 740 feet. The cable in question is said to be the longest in the world, with a single exception—namely, the cable across the Kistna, measuring some 5070 feet. There are also two cables across the Ganges, of 2900 and 2830 feet respectively.

An El Paso dispatch says a Scotch firm will erect large works in Mexico, probably at the capital, and that other British industries contemplate a similar move. Smelting works especially invite capital.

Drilling Machine and Link Miller and Slotter.

The engravings represent a horizontal and radial drilling machine and a link miller and slotter invented by P. Leeds, master mechanic Louisville and Nashville Railroad, and manufactured by Pedrick & Ayer, of Philadelphia, Pa. The drilling machine is designed to work on or from a



DRILLING MACHINE, MADE BY PEDRICK & AYER, PHILADELPHIA.

drill press. It is mounted on the frame and is driven direct from the drill-press spindle. It is useful in drilling the ends and diagonal parts of frames; it can also be mounted on the work and driven by a sliding shaft and universal joints. Drilling in all directions can be done with the two taper shanks and the horizontal and vertical movements by loosening the nuts shown. The machine does away with the ratchet worked by hand, and it is capable of drilling with as great speed as though drilled direct.

The link miller and slotter will mill out links to any desired radius. It is designed on the principle that the apex of any angle will touch or describe all parts of a circle whose versed line is equal to the perpendicular where the base is formed by the chord of the arc. It can be used on a good strong drill press or as an attachment to the heavy universal milling machine built by the same firm. It consists of a jointed frame having dove-tailed slots running lengthwise to carry a frame that has the link blank secured in it; this frame is actuated by the screw and hand-wheel and describes a circle, according to the angular position of the lower or jointed frame; flanges are cast on the bottom of this frame for the purpose of bolting down on the table or platen. In the center of the lower frame, at the center of the joint, is a bronze bushing that is set exactly under the center of the drill-press spindle; this serves as a lower support for a boring bar and the shank of the milling-tool arbor. In practice it is found more convenient to drill a hole in one end of the link to be slotted large enough for a boring bar to pass through, then by using a double-end cutter the slot is cut out to nearly the finished size; the link is then moved along $\frac{1}{8}$ or $\frac{1}{4}$ inch and is cut through again until the stock is removed; a milling cutter similar to a reamer is then used and the slot is finished to the radius for which the link is set. With this attachment a link 20 inches long is finished in about four hours.

In connection with the fifth annual meeting of the Ohio Gas-Light Association, at Mansfield, Ohio, March 20 and 21, 1889, there will be an exhibition of gas stoves,

engines, burners, electric motors and any and all kinds of apparatus and appliances of interest to gas men and the lighting fraternity. An exhibition of this kind was announced last year for the annual meeting at Sandusky, Ohio, and while it constituted an interesting feature of the meeting, it was only partially successful, on account of the extremely short notice that was given to manufacturers and dealers

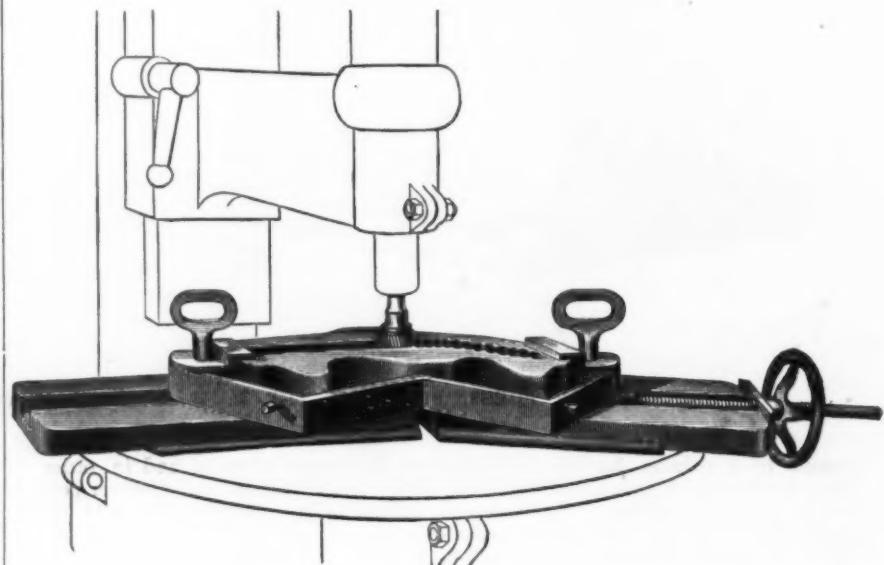
Cleveland Weighing Bureau.

The report of Holland W. Davis, joint weighmaster of the Cleveland Weighing and Inspection Bureau, from June 1, 1888, when the inspection began, to December 31, is given below. The Detroit and Cleveland Steam Navigation figures are from June 1 to October 31 only, the Cleveland and Canton from July 1 to August 21, and the Empire Line from November 1 to December 31. The figures given are in thousands of pounds:

	Ship's wt.	Act'l wt.	Excess.
Pennsylvania.....	49,215	55,600	7,444
L. S. & M. S.	41,064	47,576	6,511
N. Y., C. & St. L.	24,260	27,283	3,022
N. Y., P. & O.	8,215	9,253	1,038
C. C., C. & I.	8,389	9,324	935
Valley.....	3,448	4,135	687
D. & C. Nav. Co.	391	444	53
lleveland & C an- ton.....	210	253	42
Empire Line.....	139	154	14
Total.....	135,395	155,086	19,751

This excess of 9876 tons, discovered and corrected by the bureau, amounts to 13.85 per cent. of the freight inspected. Mr. Davis estimates that 60 per cent. of the excess discovered was fourth, fifth and sixth class freight, with an average rate of 10 cents per 100 pounds, and 40 per cent. first, second and third class matter, with an average rate of 15 cents per 100 pounds. At these estimates the excess tonnage discovered would amount to \$23,702; the estimated gain in changes of classification discovered is \$1306; deducting expenses of the bureau, \$3685; the net gain to the railroads for this period was, therefore, \$21,223. Mr. Davis says that the percentage of excess weights obtained is as great now as when the bureau began business last summer.

R. F. House, of Pomona, Cal., has contracted to sell his seedling oranges at \$1.10 a box. He does not have to pick, pack or haul any of the oranges. The pickers gathered 60 boxes of fruit on the first day



LINK MILLER AND SLOTTED, MADE BY PEDRICK & AYER,
PHILADELPHIA.

the arrangements must be sent to Geo. S. Harris, Superintendent Gas and Electric Light Companies, Mansfield, Ohio.

A committee of the National Board of Steam Navigation, of which President Cheney is chairman, will arrange the marine portion of the centennial celebration of the inauguration of President Washington.

from eight trees in their regular order in the orchard. The total value of the fruit picked that day is \$66. That is at the rate of \$8.25 per tree. There are 100 trees to an acre on the place, and at this rate an acre is worth \$825. The orange orchards of William O'Connor, Dr. Nesbit, James Loney, J. D. Cason and W. H. Woody, in the same locality, will produce the same handsome results.

THE WEEK.

The bill for the admission of four new States, North and South Dakota, Montana and Washington Territory, was signed by President Cleveland on Friday, in honor of Washington's Birthday, so that now 42 stars will represent the national Union. Dakota was organized as a Territory March 2, 1861. It comprises an area of 150,932 square miles. A special census, taken in 1885, showed a population of 415,610, and in 1887 the Governor estimated the population at 568,477. The total assessment of property in 1887 was \$157,084,365. Montana was organized as a Territory May 26, 1864. It comprises an area of 143,776 square miles. Its present estimated population is 175,000. The total taxable value of property in the State in 1886 was \$55,076,871. Washington was organized as a Territory March 2, 1853. It contains 79,994 square miles. By a census taken in 1887 it was shown to contain a population of 143,669.

According to the report of a Massachusetts legislative committee all the grade crossings of railroads in that State must be abolished. There are 2902 intersections of highways and railroads, and to carry out the purposes of the law would necessitate the expenditure of \$48,000,000.

A tugboat fireman was scalded to death in the boiler-room of the J. Jewitt, at Pier No. 13, East River. Becoming wedged in behind the boiler he broke the glass water-gauge and was enveloped by the escaping steam.

The "Young Napoleon of Finance," Henry S. Ives, and Geo. H. Stayner, a business partner, together with E. W. Woodruff, of Newark, N. J., whose exploits in connection with the affairs of the Cincinnati, Hamilton and Dayton Railroad startled the business world a few months ago, are now entangled in the meshes of the law. It is charged that when they failed, August 11, 1887, they owed \$16,000,000. President Dixon, who is now in this city, states that in addition to nearly \$3,000,000 received by them on deposit prior to August 1, being the proceeds of certain mortgage bonds issued for a specific purpose, Ives, Stayner & Co. appropriated to their own use \$624,900 worth of new stock issued for improvement purposes, \$65,000 worth of negotiable bonds, 8840 shares of the stock of the Terre Haute and Indianapolis Railroad, which belonged to the company, and \$10,000,000 of the preferred stock, which was issued in the names of clerks and book-keepers of the firm. On the day when they took \$6,000,000 worth of this stock, the firm, as shown by their books, had cash balance of less than \$13,000, and at the close of the day's business only \$70,000. Yet on that day their liabilities were \$13,500,000, all payable on demand or at short notice. Ives and Stayner are in Ludlow Street Jail in default of \$50,000 bail.

The American minister to Japan has signed a treaty of commerce, amity and navigation with Japan, a copy of which will be forwarded and laid before the Senate.

The city of Bangor, in Maine, has a water system constructed by the Holly Company, of Lockport, N. Y., which drowns out fires without the need of engines. The water is taken from the Penobscot, 1½ miles above the business center of the city, at which point a big dam was built across the river at an expense of \$250,000. The dam is 900 feet long, from 55 to 85 feet in breadth at the base, and has a sluiceway for rafts and logs 33 feet wide by 317 feet in length. The whole volume of the Penobscot falls

over this great dam, and when the river is at freshet pitch the sight there is grand. At the pumping station they have a 225-horse-power engine, which was used the first year the system was in operation, but ever since then water-power has been used exclusively, the five original wheels, with two recently put in, having a pumping capacity of 10,500,000 gallons daily, whereas only about 2,000,000 gallons are ordinarily needed. There are 25 miles of street mains in Bangor, besides several miles in the opposite town of Brewer, supplying 2700 water-takers and nearly 200 hydrants. To wet down church steeples or inundate the surrounding country it is only necessary to connect with the nearest hydrant.

A second electric street railroad was operated in Boston a few days ago, connecting Bowdoin square with Harvard square, in Cambridge. The roads are about to test the feasibility of the overhead system in crowded streets. Respecting the practicability of underground wires, the National Electrical Association, in session at Chicago, were almost equally divided. Although a committee previously appointed reported that conduits in almost every instance were a failure, Professor Barrett, of Chicago, said the underground system had proved to be an entire success. Mr. Johnson, of Philadelphia, said that the underground system was also in successful operation in the Quaker City.

Twenty carloads of agricultural machinery, valued at \$100,000, arrived in San Francisco last week from Madison, Wis., consigned to a single house. Another train of 20 cars loaded with steel-axle farm wagons will follow.

James C. Flood, of the once famous bonanza firm, Flood & O'Brien, whose estate in California is valued at between \$7,000,000 and \$8,000,000, died in Germany, February 21, of Bright's disease. He was born in New York City in 1826. Going to California in the early days of the mining excitement, he soon became associated with several leading speculators, and by obtaining control of valuable gold deposits on the Comstock lode, the partners ultimately took out \$300,000,000 of ore in the course of six years, each of them at one time taking out about \$750,000 in a single month. Their next step was to organize the Nevada Bank, with a paid-up capital of \$10,000,000. At a later day the bank became involved in the California wheat deal of 1887, in which the loss was about \$11,000,000, and Mr. Flood never recovered from the blow. His magnificent residence in San Francisco, completed in 1886, is said to have cost \$5,000,000, including its accessories. Flood & O'Brien's office in Wall Street will be remembered as a resort for the *habitués* of that section, but without the least pretensions to elegance, its entire equipment consisting of little more than a desk and a few chairs.

Manufacturers in Pennsylvania protest against the imposition of the three-mill tax on the capital stock of manufacturing corporations. Among those who are most active in their opposition is H. W. Oliver, of Pittsburgh; Cyrus Elder, of the Cambria Iron Works; Lucinda Furnace Company and Jones & Loughlin, of Pittsburgh.

The Interstate Commerce Railroad Association, as now completed, comprises a membership of 18 roads out of the 22 which were originally deemed necessary to the adoption of the agreement. The principal company holding off is the Chicago, Burlington and Northern. It is stipulated that the agreement shall take effect immediately. Aldace F. Walker, of the Interstate Commission, was offered the chairmanship. The recent meeting of the trunk line presidents, in this city, resulted

in placing upon Commissioner Fink the duty of furnishing the Federal officers with all the evidence that he can secure to convict roads that violate the national law, and it is said that he is determined to act without regard to considerations of policy in a last desperate effort to induce the roads to maintain tariff rates and thereby secure remunerative returns to stockholders and stable rates for shippers.

A seam of coal took fire on the Cincinnati Southern Railroad, near Sunburnt, Tenn., caused by a collision of freight trains in a tunnel at that point. Some of the cars being loaded with oil, the flames communicated to seams of coal and timbers supporting the tunnel, burning fiercely. Walls were erected and the entrances closed up in the hope of smothering the flames. The loss is computed at \$425,000, including the cost of rebuilding.

The ceiling scandal, at Albany, has become notorious. The facts, briefly told, are that the old stone ceiling, which was considered unsafe, was removed and another substituted, but the contractors, taking advantage of the vague terms of the contract, put up a cheap ceiling and put in a bill for a good one. They ask \$270,000, and, as it has been shown by experts that the work cost only \$165,000, a clear profit of \$105,000 is the result. New York has been unfortunate in the building of its Capitol. It has already cost \$18,000,000, when the original estimate was \$4,000,000. The penalties for breach of contract should be rigorously exacted where the offense is proved, before we have a carnival of robbery in which law-makers figure most conspicuously as law-breakers and the machinery of justice become a contemptuous farce. The committee of the Assembly who were charged with the subject made a report, in which they find that the experts were substantially right in their estimate of the profits on the job. The committee place them at about \$85,000.

The specifications for the armored coast defense vessel for which bids are to be opened March 15 have been completed in the Bureau of Construction and Steam Engineering in the Navy Department. The vessel is to be of 4000 tons displacement, 250 feet long, 50 feet beam, and 11 feet 7½ inches deep from the top of the main deck beams to her inner bottom. She is to be armored with steel plates 16 inches in thickness, and is to be built throughout of materials of domestic manufacture. The total weight of her machinery, including boilers, engines and appurtenances, but exclusive of the turret machinery, is to be 431 tons. The engines are to develop and successfully maintain for four consecutive hours 5400 maximum indicated horse-power. For every horse-power over this the contractors are to receive \$100 in addition to the contract price, but if they fail to attain that horse-power they are to forfeit \$100 for each horse-power less than the contract calls for.

Sir Richard Cartwright's resolution before the Dominion Parliament designed to secure from the home government a recognition of the right of Canada to negotiate her own treaties was defeated by a vote of 66 against 94. In advocating the resolution he said: "If Canadian agents responsible to Parliament had visited Washington, various international questions would have been settled long ago. Canadian interests," he continued, "cannot be trusted in English ambassadors' hands."

The Lehigh Valley Railroad Company proposes to furnish Newark, N. J., with an abundant supply of pure water, 27,500,000 gallons daily, for \$4,000,000, and an additional supply of 25,000,000 gallons

daily for \$2,000,000 more, the entire plant and the lands overflowed to be the property of the city.

Edison will occupy 8000 feet of floor space at the Paris Exhibition with models of his inventions. Among other novelties will be a huge dynamo and an enormous lamp with 20,000 incandescent burners.

Two of the largest meat companies in the West, Armour & Co. and a new concern of which J. H. Flagler is president, threaten a lively competition in supplying the Eastern market. The last named is an organization of various cattle companies in New Mexico, Colorado and Mexico, including the famous ranches lately owned by Stephen Dorsey and Robert G. Ingersoll, and is said to have at present 20,000 head of cattle.

The initial meeting of the revived eight-hour movement was held at Cooper Union on Friday evening. Samuel Gompers, president of the Federation of Labor, was the principal speaker. S. E. Shevitch, the so-called socialist editor, said: "All the virgin forests of the world cannot produce enough clubs to club the movement down. There is not lead enough in the mines to make bullets to shoot it down."

England contemplates making a large addition to her naval armament. In France, 11 armored vessels are now in course of construction, five of which will be completed this year and the others in 1890 and 1891. Two steelclad cruisers are also to be completed within the same period. Eighteen cruisers of not less than 1000 tons displacement are on the stocks, and the programme for 1889-91 includes several torpedo cruisers. Furthermore, an expenditure has been authorized for the protection of the harbors of Cherbourg and Brest, and these works have already been begun. In Italy the programme of 1889-91 contemplates a gradual increase in every type or class of ship, from armored battle ships through protected cruisers, of which class this nation owns some splendid specimens, down to speedy torpedo craft and armed seagoing tugs. Russia stands third in importance, so far as relates to its naval strength, among the European powers. In addition to the existing fleet it was proposed to build 19 first-class battle ships, four second-class and ten first-class cruisers. The armorclads are now being turned out at the rate of three or four a year and the cruisers are being finished nearly as fast. Two battle ships are on the stocks and four more cruisers have been ordered in the Baltic.

Real estate sales in New York City indicate a remarkably active demand for this season of the year. Of the total for last week, amounting to \$4,750,000, property to the value of \$3,500,000 was sold at auction. A large store on Chambers street, that rents for \$19,800 per annum, sold for \$256,000 and as a rule the gross income from the prices paid is below 5 per cent.

The socialists who withdrew from the Central Labor Union a week ago met on Sunday and organized the "Central Labor Federation of New York." Ludwig Jablonsky presided and Ernest Bohm and Michael O'Brien were chosen secretaries. It was reported that 50 organizations had joined the federation, and it was decided to apply to the American Federation of Labor for a charter.

The greatness of the United States formed the theme of a thousand orations on Washington's Birthday. Among the most graceful tributes was the address of W. H. Murray, a venerable business man of Boston, who said: "When the Almighty fixed the geography of this continent He made this country possible. Egypt gave to the world records that the best scholarship of this day

is striving to decipher. Then Greece gave to the world letters and died. Then He called Rome into being, and she gave jurisprudence. He needed manners for the world and He summoned France, and France taught the world politeness. Then He needed constitutional liberty—liberty for life and property and home—and so England came into being. Then, my friends, I believe the march of events had moved forward to that point in the history of mankind that the hour had struck for human liberty to be born and crowned, and He called this country into existence [applause], and George Washington was the favored agent to assist in carrying out the Almighty's designs."

Muncie, Ind., is indebted to the discovery of natural gas for its existence, and this is true in the same sense that water has done much for navigation. Muncie has now 32 natural gas wells, capable of producing 1,000,000 cubic feet per day, equal in heating power to 5000 tons of coal. Estimating coal at \$2 per ton, the 32 wells will produce \$10,000 worth of the best kind of fuel every 24 hours, or over \$3,000,000 per year. The total number of factories of all kinds now located at Muncie is 52, and the total number of hands employed 2773. The Muncie Nail Works, employing 300 hands, are among the largest.

The Carnegie Free Library, in Braddock, Pa., just completed at a cost of near \$100,000, will be opened in a few days, not only to residents, but to all workmen in the Edgar Thomson Steel Works. The structure is of solid rough-faced stone from Ohio quarries, three stories high and of the Romanesque style of architecture, surrounded by beautiful walks and a roadway. The main entrance is surmounted by a heavy stone arch, above which the stonework is carried up to a Romanesque gable. On each side are the entrances to the store of the Carnegie Co-operative Association. The entrances are in the form of round bay-windows and run up into a tapering roof. In the gable of the center is a bust of Mr. Carnegie, and immediately under it is carved "Carnegie Library." Just under this and extending entirely across the front is a carved stone frieze 5 feet high. The roof is of iron throughout, also the rafters and beams. The beams and girders were all turned out by Carnegie's Homestead Mill and are very heavy structures, the beams all being 12-inch. The building probably contains 1000 tons of iron. The structure is 100 feet square. The side and rear walls are of fire-brick of great thickness. No wood was used except for finishings and floors. The library room is 86 feet long by 30 feet wide, and contains cases for over 5000 volumes.

The result of the extensive Japanese emigration to Hawaii has been to throw most of the Portuguese laborers out of employment, as they demand higher wages than the Japanese. About 2000 Portuguese are making arrangements to remove to the new State of Washington, if they can find suitable lands.

One of the largest gas wells in the country has been struck at Lancaster, Ohio.

Rumor says that it is the intention of the Manhattan Elevated Railroad Company to build a third track between the two tracks existing at present on the Sixth and the Third avenue lines. Express trains, it is said, are to be run to the Battery during the morning, and from the Battery during the rush of traffic in the afternoon. Inquiry resulted in obtaining no definite information.

The hull of the steamer Bristol, burnt at Newport, was bought by C. H. Gregory & Co., of New York, for \$13,450, and will be broken up.

MANUFACTURING.

Iron and Steel.

After being idle one week, the entire plant of the Keystone Iron Works, Limited, at Reading, Pa., resumed operations in full on Monday, the 18th inst.

The Bellaire Nail Works, of Bellaire, Ohio, have had under consideration for some time the subject of building an additional blast furnace, of the same size as their present one, but as yet have not arrived at a final conclusion in the matter.

The works of the Beaver Valley Mfg. Company, at West Bridgewater, Beaver County, Pa., which were totally destroyed by fire in August of last year, have been rebuilt, and have resumed operations. The new building is a frame one, 60 x 160 feet, with a wing 38 x 32. The company manufacture Bessemer steel castings by a new process, by which the metal is melted in a Swedish furnace, said to be the first and only one of the kind in the United States.

On Wednesday, the 20th inst., the Secretary of the Treasury awarded to the Pennsylvania Construction Company, of Pittsburgh, the contract for the iron roof and other parts of the new Government building at Denver, Col. The amount of the contract is \$29,700.

At a meeting of the Crane Iron Company, of Catasauqua, Pa., held on Wednesday, the 12th inst., Mr. Beauvean Borie, of Philadelphia, was elected a director, to fill the vacancy caused by the death of Mr. Fisher Hazard, of Mauch Chunk, Pa.

The trouble between Morehead, Bro. & Co., proprietors of the Vesuvius Iron and Nail Works, at Sharpsburg, Pa., near Pittsburgh, and the Philadelphia Natural Gas Company has been amicably arranged and the plant has resumed operations. The firm employs about 300 men.

No. 1 furnace of the Crane Iron Company, at Catasauqua, Pa., has been blown out for repairs and the workmen are rapidly removing the lining preparatory to the mason work. No 1 is the largest in the plant, and will be given a thorough overhauling.

Keystone Furnace of the Thomas Iron Company, at Chain Dam, Pa., has been blown out for repairs.

The name of the Canonsburg Iron Company, Limited, at Canonsburg, Pa., has been changed to the Canonsburg Iron and Steel Company. Three of the stockholders having refused to sign a paper closing up the affairs of the old concern, a committee of three stockholders has been appointed to ascertain measures for effecting that end. It is hinted that there may be some litigation before this is brought about.

The Duquesne Forge Company have been chartered, to succeed the Miller Forge Company, Limited, at Pittsburgh. The new concern has a capital stock of \$2500, divided into 100 shares of \$25 each. Additional particulars regarding this new firm were given in our issue of the 14th inst.

It is expected that the large new plate mill now in course of erection by the Maner Rolling Mill Company, of Toledo, Ohio, will be ready to commence operations about the middle of March.

From the Cleveland (Ohio) *Trade Review* of the 23d inst., we take the following: "The result of the recent arbitration between the Cleveland Rolling Mill Company and the employees in the rail and blooming mills is stated as follows: The company gave the men to understand that there were orders enough ahead to keep the mill busy for a year,

provided that the work could be turned out at a reduction; but if the men insisted on the old wages the mill would have to be closed for an indefinite period. The men met and decided to accept the decrease, which will probably average 15 per cent. or perhaps a trifle more all around. The decrease was graded from 28 to 5 per cent., as follows: To all men earning \$6 a day and upward, a decrease of 28 per cent.; those earning \$5 or more and less than \$6, a decrease of 20 per cent.; for \$4 and less than \$5, a decrease of 15 per cent.; for \$3 and less than \$4, a decrease of 10 per cent., and for \$2 a decrease of 5 per cent. Laborers who earn about \$1.15 per day were not reduced. This arrangement gave about 300 men employment, less than one-half the force employed when the mill is in full operation. The barb-wire mill, it is reported, will soon be in operation."

Mr. Theo. Morgan, for some years manager of the plant of the Sharon Iron Company at Sharon, Pa., has resigned his position to accept a similar post with the Portage Iron Company, Limited, at Duncansville, Pa. The change goes into effect on March 1 next.

The annual meeting of the stockholders of the Catasauqua Mfg. Company, of Catasauqua, Pa., was held at the office in that place on Wednesday, the 20th inst., and the old board of directors was re-elected, including James W. Fuller, of Catasauqua, who was recently chosen to fill the vacancy caused by the death of Fisher Hazard, of Mauch Chunk, Pa.

All the blast furnaces of the Pennsylvania Steel Company, at Steelton, Pa., with the exception of No. 2, are in blast and doing good work. This company had 3053 names on their pay-roll for January.

The order for the discharge of 150 men from the employ of the Glendon Iron Company, at Easton, Pa., has been modified, and it is now thought that not more than 100 men will be discharged.

The adjourned sale of the Middlesex Rolling Mill, at Middlesex, Pa., and adjacent property, will take place at the United States Marshal's office in Pittsburgh on Friday next, March 1.

At the organization of the board of directors of the Junction Iron Company, of Mingo Junction, Ohio, H. M. Priest was re-elected president and general manager, and George A. Dane, secretary and superintendent.

The Fort Payne Furnace Company, recently organized, propose to build a furnace at Fort Payne, Ala.

Anderson, Du Puy & Co., Pittsburgh, Pa., are much pushed in their department devoted to the manufacture of railroad spiral springs, and are at present completing an order for 300 tons of springs for the 2000 cars which the Pennsylvania road are building, probably one of the largest single contracts for springs given to one manufacturer. They are furnishing springs to railroads and agricultural machine makers in all parts of the country. Their success in this department has led them to consider the desirability of building a separate shop for elliptic springs for use on locomotives and passenger equipments, and they expect in the near future to have this department in good running order, and thus be in shape to handle a general line of all kinds and sizes of springs. They are also increasing their tool steel department, having their present furnaces taxed to their utmost capacity.

Machinery.

The Milton Mfg. Company, of Milton, Pa., are refitting their rolling mill at that place and putting in nut and washer machinery. Heretofore the firm have made

only bar and hoop iron. The company were organized in 1888, and now consist of S. J. Shimer, president; E. S. Shimer, secretary and treasurer, and G. S. Shimer, superintendent.

The Skinner Chuck Company, New Britain, Conn., have increased their capital stock from \$12,000 to \$36,000. The additional capital was called for by an increase in the business, which has been established less than two years.

The Etna Mfg. Company, Warren, Ohio, recently received an order from Chicago parties for another of their large engines. It is for a 500 horse-power engine, with boilers and fixtures all complete, for the Chicago Steel Rivet Company, of Chicago, Ill. The engine is to drive a train of rolls in their new mills which they are now building at Hartford City, Ind.

The Phoenix Machine Company, of Cleveland, Ohio, manufacturers of steam cranes, have several large contracts on hand. They are building 18 cranes for the Anniston Pipe Company, at Anniston, Ala.; three large cranes for parties in Milwaukee; one for Charleston, S. C.; a large crane for a party at Chattanooga, and one for a Pittsburgh firm. They have orders enough on their books to keep them running over a year.

The Fuel Gas and Electrical Engineering Company, of Pittsburgh, have about decided to build a foundry and machine shop at Wilmerding, on the Pennsylvania Railroad. The Westinghouse Air-Brake Company have purchased a tract of land containing some 31 acres near that place for \$90,000, and there is some talk that all the Westinghouse enterprises will be moved to that place. The new air-brake building at Wilmerding will not be completed until the latter part of the summer.

Rankin & Fritch Foundry and Machine Company, St. Louis, Mo., have lately placed in position in their machine shop a planer to be used in the manufacture of plate glass machinery, which is one of their specialties and in which they have a large trade. The dimensions of the planer are 32 feet long by 8 feet wide, and by resetting can be made 24 feet wide, should the work so require. They are also laying the foundation for a boring mill, which will be one of the largest in that section, the weight amounting to something over 67 tons.

Hooker Colville Steam Pump Company, St. Louis, Mo., report an active demand in their line. Among the orders lately received was one from N. K. Fairbank, St. Louis, for a large size air pump to be used in their lard factory.

St. Louis Drip Pan Company, St. Louis, Mo., have completed their works and placed in position the latest improved machinery for the manufacture of drip pans, and inform us they are now in a position to fill orders for any size that may be required.

Arthur O'Malley, whose address is in care of the Peck, Stow & Wilcox Company, of 27 Chambers street, New York, would like to correspond with New York manufacturers of petroleum burning engines.

The contract for furnishing machinery for the Mare Island Navy Yard has been awarded to the S. C. Forsait Company, of Manchester, N. H., for \$5240.

Hardware.

With reference to an item which appeared in our last issue with regard to the recent fire in their No. 2 mill, the Washburn & Moen Mfg. Company, Worcester, Mass., advise us that only two upper floors were injured; that nearly all the machinery in the building was running again on Wednesday, the 20th inst., and that there has been, and will be, no delay whatever

in the execution of orders. A brick story has been added in place of the Mansard roof which was burned, and the building is now nearly roofed in.

Freeman Wire Company report an active demand for work in their specialty department. They have a force of men engaged in erecting the iron framing round the elevator hatches in the Odd Fellows Building, St. Louis, preparatory to constructing the channel and iron wirework inclosures for the elevators on Ninth street and Olive street sides of the building from second story to eighth story inclusive. They have completed the work of inclosing the elevator in the Hotel Belvedere, St. Louis, with expanded metal panel work, and have now under way several contracts for office railings, to be made of this class of work. The season is not far enough advanced to create much demand for fence work as yet, and the only order of importance under way is an elaborate channel iron and wire railing, made of long diamond wirework, with casting rosette center and cast-iron post in the panels, to inclose a cemetery lot for a wealthy gentleman in Arkansas.

At the annual meeting of the stockholders of the American Tack Company, of Fairhaven, Mass., held on Thursday, the 14th inst., the following officers were re-elected: Directors, O. P. Brightman, Loren Snow, J. A. Beauvais, E. W. Harvey, of New Bedford, and C. D. Hunt, of Fairhaven; clerk and treasurer, J. A. Beauvais.

A. M. Bristol, Rochester, N. Y., manufacturer of registers and ventilators, is making large additions to his plant, which when completed will about double its present capacity. He will also add a number of new sizes to his assortment in time for this season's trade.

The wood shop of the Cortland Door and Window Screen Company, Cortland, N. Y., was destroyed by fire the 18th inst., but their large storehouse, located some distance from the factory and containing goods manufactured by them for the last six months, remains intact and without injury. This will enable them to fill orders now on their books with considerable stock to spare, and as they rebuild at once and on a large scale they expect to fill all orders which may be sent them with their usual promptness. They advise us that their stock on hand consists of about 8000 dozen window screens and 30,000 doors. The new shops will consist of one building 200 x 60 feet, three stories high, and another 150 x 40 feet, one story high. They expect confidently to be in running order on or before April 1.

The Adams Coke-Bottom Mfg. Company, recently organized at Pittsburgh, are erecting a number of experimental ovens at Mansfield. The company, which has been organized with a capital of \$5000, has received its charter. The ovens are constructed with a false bottom that is worked by hydraulic pressure. They claim that it will be an immense saving in labor. At the present time one man is able to draw from three to four ovens per day. Their system will enable one man to draw 25 ovens per day. Another advantage is that the ovens are not damped when the draw is made. A new bottom can immediately be put in, and four drawings can be made instead of three, as at present.

The Iron Land Company, of Minnesota, with £1,000,000 capital, has been launched in London. The company have purchased 2000 acres of the Vermillion range, which, it is estimated by the promoters, will yield 1,250,000 tons of ore annually at a profit of 2 shillings per ton..

The Iron Age

New York, Thursday, February 28, 1889.

DAVID WILLIAMS, - - -	PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, JR., - - -	EDITOR.
GEO. W. COPE, - - -	ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - -	HARDWARE EDITOR.
JOHN S. KING, - - -	BUSINESS MANAGER.

The Presidents' Agreement.

The questions regarding combinations in trade—trusts and the like—and also regarding the necessity or undesirability of legislation specially directed against them are important problems awaiting solution. What has now come up for general discussion was a few years ago confined to railroad matters. The supposed dangers of combinations among carriers led to the passage of the Interstate Commerce act, prohibiting pooling. We are now, however, called to look upon another side of the case—that there is an intimate connection between stable, open rates and public welfare, and that without association of some kind such rates are impossible. Hence it is that the mercantile community have in general supported the presidents' agreement heartily. At the same time, it is conceivable that there might be opposition to any legislation regarding trade combinations, and yet in favor of some restriction upon our railroads. This grows out of the essential physical conditions of a railroad, which forbid that it should ever be a free highway, or that the competition of capital with capital can there be relied upon to work always for the interest of the public at large, as is often claimed to be the case in business affairs. From these considerations it is unlikely that, as a matter of politics, the section forbidding railway pooling will be soon repealed. Our Western States would hardly favor such repeal.

In this view the agreement becomes an important step toward securing the good results of association. Its weakness is also its strength. By relying upon a certain measure of publicity, upon arbitration, upon public approval, rather than upon extreme penalties, the framers showed their wisdom. Too many railroad agreements have gone to pieces because they sought to accomplish too much, because their complete fulfillment demanded a practical surrender of each road's autonomy. It is to the credit of the presidents that they have provided for the non-observance of the tariffs when any company considered such action imperative for its own preservation. To this extent the agreement will be indorsed even by the anti-railroad sentiment of the Granger states. No road is bound to any theory of injustice, only that each one should do openly and for good reasons whatever it thinks best.

Directly in line with this phase of the situation is the statement of Judge Cooley and his associates that the law should be enforced. It is conceded by all that the sections about publicity of tariffs, against secret rate cutting and the like are excellent. Let them be put in practice and violations punished. Let the railroad managers be freed from that false notion that violations of the law of the land should not be pointed out and stopped by

the action of railroad men themselves. If a carrier has information that a competitor is violating his pledge and making underhand concessions, it is the poorest of all retorts to begin doing the same thing. Rather let the injured party bring the offender before the proper tribunal. The time is coming when the merchants in their own interest will demand adjustment of such troubles rather than hope for a further spread of the discrimination, in vain belief that they are its sole beneficiaries.

The railroad situation cannot be cleared up at once, and those investors who look for immediate return to old earnings will be disappointed. Extensions of lines into non-paying territory must continue for a year or two to be a drain upon the parent road. A railroad as well as a merchant may be brought near to bankruptcy through having valuable but unsaleable assets. Then, again, the channels of trade are constantly changing; a roundabout line built at high cost may, like the Missouri, Kansas and Texas, find itself out of the flow. It is a strong point in favor of the presidents' agreement that it does not pretend to regulate or decide everything of this kind, but contents itself with arranging for such a presentation of disputed points as will enable a fair decision from all concerned. It seems unlikely that the refusal of a few roads to join will be able to prevent the ultimate moral success of the plan.

The Nicaragua Canal.

The final passage, in its amended form, of the Nicaragua Canal bill by Congress and its signature by the President may be looked upon as foreshadowing an important era not only in American ocean trade, but also in that of the world at large. When, prior to the adoption of the Panama Canal route, M. de Lesseps and his engineers assembled at Paris, the choice to be made was between Panama on the one hand and either Nicaragua or the Atrato on the other. It was urged at the time by the American engineers that Nicaragua, judging from the surveys previously made by order of the United States Government, seemed by all means the most advisable route. It was urged, and is quite as much asserted now, that good terminal harbors are necessary adjuncts to any project, for vessels *en route* must have spacious roadsteads affording them protection while awaiting transit. As a rule isthmian routes possessing the best termini have the worst internal features; but the reverse seems to be the case with Nicaragua. The most eminent engineers in the world have studied and approved the plans proposed for the restoration of Greytown and Brito harbors. The advantages claimed for a canal at this point are: first, that it is in a favorable geographical position, being in a region of perpetual trade winds—which position, by the by, is also eminently favorable to the United States; second, that the canal can be constructed here at less cost than by any other route; third, that it passes through a country rich in resources and already sufficiently developed and populated to furnish subsistence to the construction force; fourth, that it presents no novel engineering problems, nor any that cannot be solved at a moderate expense; fifth, that it is a fresh-

water canal, and will perform an important function in scouring ships' bottoms and boilers; sixth, that it offers splendid facilities for dockage and repairs on Lake Nicaragua; seventh, that the material needed for the construction of the canal is close at hand; eighth, that all the plant can be conveyed by water communication already established, and by roads for which no royalty will be paid; ninth, that the mean average rainfall is comparatively small, and, tenth, that it possesses a superb inland sea, which drains 10,000 square miles of country, and thus gives a full volume for canal purposes.

Flushed as M. de Lesseps was with the success of the Suez Canal, and by reason of the latter predisposed in favor of a sea-level canal without locks, Panama was given the preference. The experience since made has amply proved that it was a fatal decision. It involved the ruin of the present shareholders' interest, and even in its modified shape of a canal with locks it is too expensive and too risky for any new company to finish, even if nothing were paid for all that has been so far accomplished and for the plant on the spot. In fact, the only thing that M. de Lesseps' company owns which is worth anything is the Panama Railway and the land so far granted by the Colombian Government.

The Nicaragua Canal will extend over a distance from ocean to ocean of 169 miles, of which 56½ miles are on Lake Nicaragua and 84½ miles on the rivers that are to be deepened and widened. The canal proper to be dug will not exceed 28 miles in length. There are to be six locks, three on the Atlantic side and three on the Pacific side, while for over a distance of 152 miles the maximum elevation above the level of the sea will be 111 feet. The present estimate of cost is \$65,000,000. The charter of the company nevertheless fixes the capital stock at \$100,000,000, to be doubled if need be, and the canal may be finished in 1895. Prior to signing the bill President Cleveland gave a hearing at the State Department to the friends and opponents of the measure, in order to determine whether there were any valid legal objections to the approval of the bill. Simon Sterne and John T. McCook, of New York, representing the American Atlantic and Pacific Transit Company, made arguments against the bill. The former contended that it was clearly unconstitutional, contrary to the spirit and traditions of the United States Government, and entirely unnecessary and vicious in that it recognized and encouraged one corporation to the detriment of others equally if not more deserving. Mr. McCook argued that to allow this bill to become a law would be an act of great injustice to Americans and Englishmen holding nearly \$2,000,000 of bonds of the Atlantic and Pacific Transit Company, and would undoubtedly lead to serious complications with Great Britain. Judge C. P. Daly, of New York, replied in behalf of the Nicaragua Maritime Canal Company, contending that the constitutional features of the measure were fully and freely discussed in Congress, and that no unlawful powers of concession were conferred by the bill. Subsequently the Clayton-Bulwer treaty was also gone over, and on February 18 Secretary of State Bayard and Attorney-General Garland made a report favoring the bill.

Since then Commander Taylor, general manager of the company, stated that they would organize and begin work promptly. The first work would be done at Greystown, and as soon as the entrance there was improved to 15 feet, which will probably take about two months, work is to start up all along the line. Last year Chief Engineer Menocal, Engineers H. C. Litchfield and Peary, together with M. Le Baron, made a thorough and careful survey of the entire route, and upon their report the company was formed. As the bill was at first opposed by strong influences in Congress, a preliminary charter was obtained from the Vermont Legislature, but the incorporation by our National Congress is a decided advantage gained, inasmuch as it lends the enterprise a specifically American character.

It may not be out of place to cite what the London *Times* of February 8 remarks on the subject:

It does not follow from the passing of the Nicaragua Canal bill that any vigorous steps will be immediately taken to carry the project into execution. Probably the immediate object is fully served by the passing of the bill. The progress of the Panama Canal is effectually arrested, and something may depend upon the measures that may be taken when that fact has been fairly brought home to the French investors. Negotiations may be attempted with a view of getting the works taken over at the price by an American company, and their success will depend upon the opinion entertained in America as to the feasibility of the route. One thing is certain, that the Panama company will negotiate under serious disadvantages. Every week that passes will depreciate the value of the plant and of the partially executed excavations, while the Americans will have plenty of leisure. When one party is anxious to sell and the other in no great hurry to buy, the price is likely to be moderate. It is quite possible, however, that the Americans may prefer to work the Nicaragua route, in which case the whole of the Panama company's expenditure seems likely to be lost. All that is quite clear at present is that the United States mean to be masters on the traffic route between the two oceans.

It has been asserted in Congress during the debates that if Americans were offered to-day all that has been done on the Isthmus of Panama in the canal enterprise for nothing, provided they would undertake to finish it, it would still be both cheaper and safer to leave Panama severely alone, and confine the undertaking to Nicaragua instead. We candidly confess that we unreservedly concur with this view.

In a letter to the Senate Finance Committee, under date of December 11, 1888, Fred J. Slade, of the New Jersey Steel and Iron Company, states that after an examination of the books of the company he finds that the cost of the most expensive size of beams and channels made at the works is \$35.90, and for the cheapest \$58.34, per ton of 2240 pounds, charging no interest on the plant. At that time the selling price was \$73.92, which usually includes delivery. The company have therefore made on these shapes a profit of from \$8 to \$15 per ton—say an average of \$12. The average yearly product of each mill is less than 9000 tons, making a profit of some \$100,000 per year on an investment of over \$1,000,000. Since the date of Mr. Slade's letter the price has been reduced to \$62.72, so that now the returns on capital are decidedly modest. These figures are worth

pondering over by those who have raised such an outcry against the beam combination, and should put a stop to the wild assertions of those who undertake, with the Hon. W. L. Scott, to figure out that the cost of beams and channels may be readily calculated from alleged cost figures of steel rails.

The Drawback System.

We print elsewhere a letter from one of the leading manufacturers of lead pipe and sheet lead in the country, in which some data are given clearly demonstrating the injustice of the retention of 10 per cent. of the duties on raw materials used to manufacture goods for export. The Treasury, which does not need the money, retains amounts considerably in excess of the cost of collection and supervision. The whole drawback system needs readjustment in accordance with simple principles. If an American manufacturer can secure foreign raw material, convert it into finished product in this country, and sell it in the markets of the world in competition with foreign rivals, he certainly deserves encouragement. He is adding to the amount of work being done here. He pays for wages, rents, fuel and supplies for which there would not be a demand but for his enterprise. His profits, however large or small they may be, remain in this country. He adds to the volume of business done, and aids in securing whatever advantages there may be in educating foreign buyers to look to us for their purchases. As matters stand now all these advantages are deliberately sacrificed. There are few articles in which American manufacturers are so far in advance of their foreign rivals that the economy of improved methods overbalances the additions to cost through extra handling, through higher wages, costlier fuel and supplies, and the necessity of earning on an average a higher rate of interest on his capital. To this would have to be added the cost of supervision by the Government of the entry of foreign material and the export of goods manufactured therefrom. It is conceded that such supervision should be thorough and close. It is only fair that the industry causing the expenditure on the part of the Government should bear the cost thereof. But it is undesirable and unnecessary that the Government should make a large profit on the transaction.

Under the circumstances, with the high retentions, the amount of business done is very small indeed. Nearly all there is of it is confined to the manufacture of packages for American products sold for export. It so happens that the Standard Oil Company is the chief beneficiary of the system, and that fact alone has been enough to create a prejudice against it which demagogues have been eager to foster. It is argued that by saving the amount of money returned by the Government that monopoly is adding to its already exorbitant profits. We are inclined to look at the matter in a different light. Anything which will cheapen the cost to foreign consumers without prejudice to American interests is so much gained in the direction of fostering consumption and extending trade.

Another argument, sectional in its character, is advanced against a more liberal

and a juster drawback system. Let it be assumed that works at tidewater succeed in building up a large foreign trade, based on imported raw material. This will enable them to give full employment to their plants, even in dull times. Other things being equal, they have the advantage, as against their rivals in the interior, of lower general cost, which is the result of full order books. They may even be content to sacrifice a part or the whole of their profits on work for foreign markets in order to compete more effectually with domestic rivals. In other words, a lowering of the retention to figures covering only cost of supervision to the Government would be equivalent to a discrimination against inland manufacturers.

It is possible that this contention may be just in some cases, but we are inclined to believe that the benefits to be derived from a modification of the present law would far outbalance any probable local injury. Incidentally it may be noted that it would silence the cry for free raw materials on the part of those who honestly believe that they can compete in the markets of the world.

The Westward Course of Empire.

The past week has been signalized by an event without precedent in the history of the United States, denoting "the march of empire." Using as an implement a quill plucked from a Dakota eagle, President Cleveland affixed his signature to a bill admitting four States of an enormous superficial area and of unbounded resources into the American Federal Union. The importance of the act cannot easily be exaggerated. Referring to the accretion of new States, the London *Times* says it is inevitable that "the center of national gravity must be substantially altered," and that "the Americans themselves imperfectly comprehend the actual amount of metamorphosis involved," doubtless meaning that the ascendancy acquired by the original 13 States and by other States which from time to time have dropped into the federal galaxy must gradually depart, and other millions of populations beyond the Mississippi River and spreading far out over the Western plains and beyond the mountains must have a controlling voice in the national councils.

Some of the best known Senators express themselves in unequivocal terms. Senator Cullom, of Illinois, says: "The admission of four States into this Union is a great event. It has occurred that two States have been taken in at one time, but it has never before occurred in the history of this country that the Congress of the United States has provided for the admission of four great commonwealths into the Union at once. These Territories are possessed of all the elements that justify their admission into the Union in population, resources, civilization, and all that makes them worthy of Statehood."

Senator Platt, of Connecticut, says: "The admission of four new States at practically the same time is an event the importance of which can scarcely be estimated. Probably a million of people are now permitted to assume the responsibilities and enjoy the privileges of complete self-government; and when we consider the abundant natural resources of the Ter-

ritories thus to become States, it is not too much to expect that within ten years 5,000,000 people will find homes within their borders and employment in every branch of industry and enterprise known to our civilization, limited only by climatic conditions. They are to be States of great development and will add immensely to our national power and opportunity."

Senator Hiscock, of New York: "I hardly know what more to say than that the admission, or rather the enabling act, was just and proper. They too long have been kept out for partisan or party purposes."

Senator Butler, of South Carolina: "My opinion is, each of the States admitted was entitled to become a State because they all have the necessary qualifications for Statehood—population, resources, institutions, and a soil capable of sustaining increasing numbers of people. Beyond this I do not think Congress ought to look in determining the question of admitting States."

Senator Morgan, of Alabama: "These four States were admitted because they possessed every qualification for Statehood. They will be growing, progressive States—not rotten boroughs like Nevada, which is losing its population every year. I think all four of the new States have wonderful resources, and have a good future before them."

Akin to this subject is the passage of a bill in Congress providing for the opening of a new ocean highway between the Atlantic and Pacific oceans, thus making another large stride in the progress of our country, her trade and destiny.

At the Edison Phonograph Works an extremely simple method is in use for keeping track of the work in hand and the work finished. It is possible at a glance to ascertain the number of each piece of work under way, and also the number of completed pieces. At the engine, which is located about at the middle of the shop, is placed a board about 3 feet wide by 7 or 8 feet long. The board is pierced with vertical and horizontal rows of holes arranged, vertically, in sets of five rows. Between certain rows are left blank spaces, upon which the names of the parts of the machine are written. Reports are daily made by messenger to the man in charge of the board of the new parts being worked and of those which have been finished. If five pieces have just been begun he inserts five pegs in the holes in line with the name of that particular piece. When these five pieces have been finished the five pegs are inserted in holes in red. It is evident that a simple inspection of this board at any time will show all the work of the shop on hand, and will also show the number of completed parts ready for assembling. An important advantage of this method arises from the fact that any tendency of one part to overrun the requirements is instantly perceived, and other work is allotted to the machine making that part. Should an order be received requiring quick response, the board would show how many machines were ready for assembling and how many and what parts were needed to meet the requirements.

In the Kingston *Daily Whig* J. Bawden makes a plea for the development of the water-power of the Mississippi River, along the road of the Kingston and Penobscot Railroad.

Pig Iron Warrants.

MR. HULL REPLIES.

To the Editor:—I have read with interest the criticisms on the warrant company published in your issue of February 14, and will avail myself of your invitation to reply to same. I note with pleasure that the favorable criticisms come from parties who evidently understand the plan and purposes of the warrant company, whereas, most of the unfavorable criticisms contain clauses that show conclusively that the warrant company's plans and objects are largely, or entirely, misunderstood by the writers. From experience I am satisfied that those who now oppose it will be heartily in favor of it as soon as they understand it thoroughly, unless we except the British ironmaster, who is the only natural enemy of the American Warrant Company.

I will not occupy unnecessary space by restating the objections as published in your issue of the 14th, but will simply answer them in the order they are noted in a memorandum before me. The warrant company is not a trust or combination, and has no powers or features that can be objected to by the furnace interest or by the country at large. It was organized for no purpose that is not plainly stated by its organizers. It has no power to coerce any party into business relations with it, or to interfere with any one who may choose to stay out. It simply offers to issue its warrants for the iron put into its yards by any furnace that makes a contract with it, and the best possible guarantee the furnaces can have that the warrant company will be managed for the furnace interests is that they are not bound to do any business with it during the whole term of the contract unless it is so managed and they choose so to do.

Its capital is pledged for one thing only—namely, as a guarantee for the safe custody of the iron put into its hands. The warrant company takes no commercial risk; it does not buy or sell its own warrants; it issues them to the order of the furnaces who store the iron, has no power over them after they are issued, and has no power to control, or attempt to control, the market. It is only on such a basis that this company could hope to issue a warrant that would command the confidence of the banks and moneyed institutions, and influence the millions of money that will flow to the absorption of its warrants. The company does not loan money, as one writer supposes, but it will act as broker to secure loans for furnaces who furnish warrants as collateral, and expects to be able to place these loans promptly, for any amount desired, whenever money is to be had on anything. Enough money has already been voluntarily offered by the banks, trust companies and capitalists to absorb all the iron that can be stored with us for many months, and it is expected that the standing of the warrant issued by this company will be unquestioned, and that it will eventually command money from the moneyed centers at as low rates as any other security, not excepting the Government bond.

In one sense, the warrant company may be designated as a clearing house, by means of which the furnaces may carry or market their surplus product when the consumer does not require it, and through which they may equalize, regulate or correct the various inequalities and abuses that now exist in the iron business. Through the warrant company it is expected to bring about not only uniformity in the weight of a ton and uniformity in classification, but such other improvements and such economy as may from time to time present themselves.

Under the present system of selling iron the producer is at the mercy of the railroads, who refuse to hold themselves responsible for the loss in weight, simply because they have not been required to do so, nor has the question been put in a shape that makes the demand seem reasonable to them. They, however, hold themselves responsible for shortage in grain, which is also determined by weight, simply because the elevator company becomes a medium that can reasonably require it. The warrant company will become such a medium for the iron interest, and the railroad companies will at once recognize that the warrant company cannot reasonably be expected to give a receipt and not require one in return. The furnace company will receive pay for their iron when they part with their warrant, and any claim for shortage made at the point of destination must be proved and made against the railroad company. All iron handled by the warrant company will be weighed on two different scales to insure accuracy, and will be classified under the inspection of expert graders.

The warrant company asks the furnace companies to make their contracts for twenty years, as it is only on the basis of one powerful, substantial and permanent company that the furnaces can hope to realize the full benefit that should be derived from such an organization. If there were two or more warrant companies in this country, they could not possibly command the support and confidence of the banks to the extent that one company would. We have found no one to object to the 20-year clause after they have understood the scope and objects of the company, but, on the other hand, several of the furnaces that have made contracts with us have insisted that we should on no account make contracts for less time, as the furnaces, more than any one else, were interested in insuring one powerful company. If the furnaces bound themselves by the contract to yard a certain amount of iron each year, there would be some reason to object to the 20-year clause, but they are free to handle their own iron across their own yard, and ship direct to consumers, as before, with all or any part of their product, and they will naturally only use the warrant yard to the extent that it is to their interest to do so.

An objection made to the warrant company is that "it will aid the poor furnaces;" that the rich furnaces do not need it, and that it is against their interest, as they claim it will simply keep alive the poor furnaces, whereas, in their judgment, the best results would ensue from their being driven to the wall and broken up, and thus be gotten out of the way. This is a short-sighted objection. The poor furnaces will not be got rid of in this way. There are more poor furnaces to-day than there were 10, 20 or 30 years ago. It is the present system of the iron business that creates these poor furnaces, and new ones will spring into existence to take the place of those that fail just as long as the present system is in effect. It is during a season of unnaturally high prices that furnaces are built in unnatural locations, simply because they can make money, even in such locations, while high prices prevail, and it is this class of furnaces that do the most injury to the iron business. They are the first to get hopelessly in debt; are at all times confident of a speedy reaction, and are responsible for the unnaturally low prices finally reached. Some system that will control the violent fluctuations will stop the building of this class of furnaces in the future. Those that now exist where iron cannot be made profitably at reasonable figures must, of course, succumb permanently, as under the warrant system there will be in the future no unnaturally high prices to revive or duplicate them.

It is claimed by many that even under our present system extremely high prices would never again be seen in this country. This is the same old story; it is repeated over and over again during each period of depression, and what is still more remarkable, is almost universally believed. But nothing is truer than that history repeats itself. We will be in a more dangerous situation on the next revival of business than ever before, as we will not again have a larger producing country than our own to draw from, as the American product of iron and steel now exceeds the product of Great Britain. If it were practicable for the rich companies to combine and raise several millions of dollars to be used to carry the product of poor but well-located furnaces over dull times, it would be a wise move and they might possibly thereby prevent the unnaturally low prices, but such a plan is not practicable. The warrant company, however, under a plan that is practicable, will not only accomplish this result, but will transfer the carriage of iron from the shoulders of the furnaces to the capitalist.

The condition of things now that will prevent the extreme prices is the carriage of large stocks. The carriage of large stocks is not possible if we rely simply upon the furnaces storing and borrowing money upon their product. Such a system is ruinous, whereas, on the other hand, the investing element of the country has shown itself ready and willing to carry almost any amount of securities that are made safe. The producers of oil, grain and many other commodities have taken advantage of this condition of things and use it for their benefit. Why should not the furnaces do likewise? Pig iron warrants, as soon as understood, will be a favorite security for investors, as iron can be carried cheaper than any other commodity, and is attended with less risk.

It is believed that as soon as the sale of iron by warrants becomes general the demand for them from investors will be great, and a warrant will be worth more than iron, as is generally the case in Great Britain. This company does not advocate or pretend to justify speculation, but simply looks at the business situation as it exists, and proposes that the iron trade shall have the advantages of this condition of affairs as well as other branches of business.

The great variety in quality of irons made by different furnaces, the great variety of classification and the great number of grades produced at each furnace are difficulties to be overcome, but are not obstacles to pig iron being put on the metal exchanges, as is claimed by some. There was just as great a variety in the classification of flour and wheat from different mills and different sections, and yet these differences have either been regulated or provided for, and the same may be done with iron. There are numerous instances in this country where irons now known by 40 or 50 different names may be grouped under one head and known by one name, as, for instance, "Lake Superior charcoal," or "Southern coke," just as the word "Glen-garnock" is one name applied to the product of many furnaces abroad.

Iron, like grain, would probably be put on the boards of trade in two separate departments—an option department and a cash department. In the option department, which would probably comprise 99 out of every 100 sales made, the difference on sales would be settled on the difference between price on the date of sale and the date of delivery for the grade which the metal exchange had made its standard to govern such sales; this would probably be No. 2 foundry, just as "No. 2 spring wheat" governs sales on wheat option boards. On this class of sales actual delivery of certificates is rarely made, a settlement simply being made on the difference

in quotations, as above. If deliveries were called for, they would be governed by the rules of the exchange as to what comprised good merchantable brands. In the cash department, however, actual certificates for the different grades pass, and in this department the mill man and foundry man or their agents will buy the actual brand or grade needed for consumption. The warrant will pass, for which payment will be made at the market price of that iron at the place of purchase, less the accrued storage charges and the official published rate of freight from the furnace to that place. In the option department it would not be necessary for the buyer or seller to know anything about quality, brands, grades, freights or location of furnaces. In the cash department, however, these features would probably enter into every sale made, and are fully understood by the parties who would deal in this department.

The introduction of the warrant system is not expected to make any difference in the territory which will consume the different brands of iron. The consumer will either buy direct, as he does now, or if he buys on exchanges will unquestionably buy warrants for the same brands and grades of iron that he is accustomed to use at the present time. The sale of iron on metal exchanges has been a failure heretofore, simply because of the absence of a warrant as a foundation for sales. Sales of grain and oil on boards were only made possible through the creation of certificates representing those commodities.

As to the "overproduction" objection, there is certainly something wrong in a system that makes a stock of three weeks' make "overproduction." This country has never produced in 10 years as much iron as it consumes in 10 years. What the American iron interest has suffered from is under-production and want of a warrant system. The farmer would certainly be considered very improvident if he was satisfied to raise during the growing months of the year only enough grain to satisfy the consumption of those months and relied upon importation to feed the country during the other eight months of the year. And yet this is exactly the principle on which the pig iron interest of this country has been working in the past, and must continue to work until we carry our iron, as well as our grain, by certificate or warrant. During every period of active business in the United States we import several millions of tons of iron and steel, which the British ironmaster has been long-headed enough to inaugurate a warrant system to carry, ready to take advantage of our improvidence. He is thus enabled to keep his furnace running during dull times, as well as during active times. There is no reason why the American ironmaster should not keep his furnace running instead, and pile up this surplus under an American warrant system, thereby supplying our own demand during active times, instead of importing large quantities from abroad, as heretofore, and permitting foreign interests to get the benefit of the high prices prevailing at such times.

Another writer claims that a large stock would be "a constant menace to the market." It is the carriage of iron by borrowers that is the "constant menace to the market." A large carriage by investors will not have this objection, and the danger from it will not exist as soon as it is known that iron can be marketed at any hour on the exchange. The government bond is not a "constant menace" to the market, simply because the demand for it is greater than the supply, and this will be the case with iron warrants.

The increase in the population of the United States is so rapid that our growth from 50,000,000 to 60,000,000 is hardly noticed, and the increase in business is so

much more rapid than the increase in population that it would be impossible, with all the available furnaces in the United States in full blast, for this country to accumulate more iron than she would consume in the first season of activity, or more than the investor will carry in the interim. (In considering this we have simply to remember the fact that when iron was \$60 per ton there were only a little over 60 per cent. of the furnaces on the official list in blast, and this is about the largest percentage that is ever likely to be in blast at one time.)

The wealth of this country has increased so enormously during the past few years that capital not only readily absorbs any security that is safe, but takes up many securities that have very little element of safety about them. There is no known security that is as absolutely safe as pig iron, and after warrants have once become known to the investor an enormous permanent carriage may be confidently relied upon, and the demand from investors will be as reliable as the demand from consumers.

The pig-iron manufacturer now has but one customer; that is the consumer. Under the warrant system the capitalist of the country would become a purchaser, and the facility thus created for placing the surplus would prevent prices ever going as low as they otherwise would. The fact that oil sold at 52 cents per barrel at the wells, on a stock of 500,000 barrels without certificate, and only went to 64 cents on a stock of 36,000,000 barrels with certificates, should be sufficient evidence of this.

Another writer urges as a reason against the success of the American warrant the fact that the Scotch warrant is for 500 tons, two-thirds No. 1 and one-third No. 3, and as mills do not use No. 1 iron and as founders do not use No. 3 iron, warrants would not suit either and users would not buy them. As the American warrant is for 100 tons of one grade only, and is entirely free from any such condition, this objection does not apply; on the contrary, the natural inference of an unprejudiced mind would be that if the British system has been a success under such drawbacks, how much more reason to expect success under the American system, which is entirely free from such objections.

Another party states that pig iron will not stand these charges, implying that the American warrant system adds to the expense of handling iron, whereas the reverse is the case. The warrant charge under the American system is 25 cents per ton. Nor is this 25 cents an expense. At present the producer must wait from 30 to 60 days after he has shipped his iron before he receives payment for the same. This loss of interest, the risk of the responsibility of the buyer during that time, and the possible loss from a claim of under-grade or under-weight on the part of the buyer, all of which, under the warrant system, the seller escapes, will more than save the 25 cents paid for the warrant. The warrant charge, therefore, is not an expense, as under the new system the warrant is paid for on its delivery. As soon as the sales by warrants become customary, the producer will make a clear saving in being able to sell his product at an expense of 5 cents per ton, in place of the present cost of from 35 to 50 cents per ton.

Another party objects to the plan because it would tend to make speculators of producers. This, again, is a mistake. Of course, producers can become speculators if they choose, but the practical result of the introduction of the warrant system is that the bulk of the stock is carried by the capitalist. In Great Britain there is no article that is as generally carried by all classes of investors as warrants. The warrant company was not organized

with special reference to furnishing aid to furnaces in any particular section, as some parties state. It was organized to furnish its facilities to every furnace in the country that chose to avail itself of those facilities. The subscription to the original stock of the company was nearly completed before it was known to any furnace man, in any section, that such a company was contemplated.

The warrant company is not in any way connected with any other organization. Business men connected with other large organizations were invited to become stockholders, simply because the experience and ability of such men were considered advantageous to the warrant company—in fact, it was recognized that if the warrant company was to be a success it must be backed by men of broad business experience as well as by men controlling vast capital.

As another writer suggests, it is of course true that when warrants are placed on stock or metal exchanges they are liable to be manipulated by the bulls and bears. This being the case, it remains with the iron producers to consider whether such influence shall be used for or against their interests. The opinion of those who have thoroughly considered the matter is that it can do them no harm, but would present opportunities of great benefit to the iron interests. The extreme fluctuations possible to be caused by these influences would be quick and sharp, and confined to probably 20 days more or less; not long enough, during such advance, to encourage the building of furnaces in unnatural locations, nor long enough, during the decline, to compel furnaces selling on it. In fact, the furnaces would simply refrain from selling during the few days of low prices, and during the few days of high prices, if caused by a corner, could reap a rich harvest by simply rushing all their surplus iron into the warrant yard and unloading their warrant on the clique who were forcing the corner. Of course a furnace company having no warrant yard could not avail themselves of this opportunity, and the possibility of such opportunities occurring is a good reason for a furnace having a thoroughly equipped warrant yard at their plant, even though they might, in ordinary times, have no use for it. The furnace interest is the only interest that could create warrants, and, therefore, the interest that would derive most benefit from a corner, or sudden advance in price. The suggestion that bears might squeeze the market and hammer prices down to unnatural figures is not an objection. This is frequently done with stocks, because stocks which have no real value may at times stand at high figures, whereas iron has a positive value, which is known to thousands of mill and foundry men all over the country, who would be quick to take advantage of any unusually low prices that might be caused by manipulation.

Some contend that the warrant company would be of no use to the rich furnaces who do not borrow money. This, however, is not the general impression. In fact, the first two parties to sign contracts with the warrant company were concerns of large wealth who had never been known to borrow a dollar, and who probably have twenty times as much capital outside of their plants as they have in their plants; the majority of those who have signed contracts with the company are among the class who are abundantly able to take care of themselves.

The objections urged by iron commission men indicate that they have an idea that the success of the warrant company might cause them to lose their agencies. There is no foundation for this fear. There is no reason why furnace men should not continue doing business with their present agents whether the sales are made by war-

rant or by handling the actual iron. The iron commission merchant would be benefited by the warrant system. The entire pig iron commission element of the United States does not now sell in one year as much iron as is produced in one year, whereas when the sale by warrant becomes thoroughly organized there will doubtless be sold in each year by warrants a hundred or a thousand times as much as is produced in each year.

The sales of oil on the New York Board alone are from 100 to 150 times as great as the entire production of the country, and the dealer in certificates nets his \$50,000 per year to-day with much greater ease than he netted his \$5000 when the actual oil was handled. In fact, in the case of pig iron the actual handling of iron must still continue, and the sale by certificates is simply an additional revenue thrown in the way of the dealers and agents, but the additional revenue derived, instead of coming out of the purchaser, comes out of the investor, and at the same time provides the investor with a less expensive commodity to handle than any he has at the present time.

All the objections urged in your issue of February 14 have been answered, directly or indirectly, in the above, except that some parties, although acknowledging that the warrant company would be of benefit to the furnace interest if it were a success, do not believe it possible to make a success of it. The best evidence of what can be done in the future is what has been done in the past. We can judge of the probable success of this plan, not only by what has been done in oil, grain and other commodities in this country, but by what has been done by the warrant system in Great Britain. If in Great Britain, where things are generally cheaper than in this country, between 1,000,000 and 2,000,000 tons can be accumulated on the warrant charge of 50 cents, it is fair to believe that a much larger amount can be accumulated here on a warrant charge of 25 cents.

Under the English system the furnaces must not only do the usual handling of the iron on their own yard, but it must be put on cars, shipped to the warrant company's yard, and there be rehandled by the latter. This extra handling does not add one farthing to the value of the iron, and is entirely avoided under the American system by establishing yards at the furnaces, where the iron can be moved directly from the pig bed and be piled at the warrant company's yard at the same expense that it is now piled in the furnace yards, and when shipped for consumption can be loaded on cars from the warrant company's yard at the same cost that it is now loaded on cars from the furnace yard, the iron being, in the meantime, in the possession and absolutely under the physical and legal control of the warrant company.

The storage of the iron covered by warrant commences from the first of the month following the date of the warrant, which gives the furnaces an average of 15 days to put their warrant on the market before any storage accrues. The investor, or carrier of the warrant, pays the storage, which is the same under the American as the British system, and no other commodity is carried at so small a cost. Although the carriage of iron by furnaces themselves is regarded as unprofitable and unwise, at the same time the carriage of that iron by some means is the great relief sought for, as it will bring about uniformity of price and make the iron business staple and uniformly profitable, if we judge by other interests that have been "liquefied" by the issuing of certificates to represent them.

Whatever doubts there may have been in the minds of the promoters of the warrant company as to its success during its

organization, there is in their minds no doubt of its success at the present time.

GEO. H. HULL,
President American Pig Iron Storage
Warrant Company.
NEW YORK, February 20, 1889.

CORRESPONDENCE.

Drawbacks on Exports.

To the Editor: Our attention has been called to the subject of the drawback on exports by your article in *The Iron Age* of February 21, and we beg leave to invite your consideration of the following in this regard. About a year ago we made some investigations, with the aid of the Department of Drawbacks of the New York Custom House, with the object of ascertaining what expense the Government is under by reason of the drawback system, and why it is thought necessary to retain 10 per cent. of the duty paid on the imported raw materials used when exported to foreign countries in the shape of manufactured goods. For the three years ending June 30, 1885, 1886 and 1887 respectively, the average amount of retention of drawback was in round figures \$220,000 at the New York Custom House. Besides this, fees are charged by the Custom House, viz.: Gaugers', inspectors', weighers' and entry fees, which amounted for the same three years to about \$80,000 a year. The total expense to the United States Government in this department for the same three years was not more than \$60,000 a year, so that there was a clear profit to the Government of say \$20,000 a year, without counting the 10 per cent. retention (1 per cent. in the case of sugar). That is to say, our liberal Government charges us \$300,000 a year for doing what costs it only \$60,000. There is another point to which we would call your attention. That is that at present foreign manufacturers can and do bring goods to this port and deposit them in warehouse without paying any duty, and then re-export them over freight lines from this port in competition with our own manufacturers, who are handicapped to the extent of the 10 per cent. of the duty on their raw material retained by our Government, with no ascertainable object whatever. It is difficult to see the reason for this extraordinary legislation. Congress has been asked to remedy this state of affairs by making the amount of the drawback equal to the duty imposed on the raw material again and again, and as there is absolutely no conflicting interest to contend against, it might be supposed that it would be easy to secure the passage of the proper measure. But the experience of the disinterested observer must convince him that the true interests of our people are not of the greatest importance to the "statesmen" who annually convene at Washington.

TATHAM & BROTHERS.
NEW YORK, February 25.

The Philadelphia Company, who have almost a monopoly of the natural-gas business at Pittsburgh, recently issued a circular to their patrons advising them to secure meters for the natural gas. After pointing out the many advantages to the consumer, as well as to the company, of burning gas by measurement, a very plain intimation is thrown out that it is probable in the near future the gas will be supplied in no other way. The conditions on which the changes will be made are that former contracts will be canceled as soon as the meters are set ready for use. For the present the charge will be 12½ cents per 1000 cubic feet, with a reduction of 20 per cent. for cash, or 10 after date of contract. For cash customers the rate will thus be 10 cents per 1000 cubic feet. The cost of setting meters and testing new connections will be \$5.

THE MINING ENGINEERS.

NEW YORK MEETING.

On Wednesday morning the members paid a visit to

THE SPIRAL WELD TUBE WORKS, of which James C. Bayles is president. The plant is on a plot of ground of about 8 acres, with a frontage of 1172 feet on the Delaware, Lackawanna and Western Railroad, and embraces the spiral and cross welding machinery, a Manning boiler 35 feet high, an Ohio Buckeye 150-horse-power engine, a water-gas plant of special design, a machine and pattern shop, and apparatus finishing and testing pipe. The spiral-welding machinery consists of eight machines, making 4, 6, 8 and 10 inch pipe, to which machines are being added to make the range between 12 and 30 inch pipe. There are two cross-welding machines. The usual sizes of skelp are from No. 14 to No. 18 gauge, the machines being able to make pipe at the rate of about a foot per minute. The largest pipe yet made was 44½ feet, the usual maximum being about 30 feet for ordinary practical working. The pipe is tested by hydraulic pressure, one 10-inch No. 14 gauge pipe having resisted a pressure of 850 pounds per square inch.

The members then proceeded to the Edison Laboratory and the phonograph works at Llewellyn, N. J., where these famous establishments were inspected, and a trial run was made of the Edison magnetic ore separator. After an elaborate lunch, of which over 300 visitors partook, a session was held in the library of the Edison Laboratory, the proceedings being opened with a paper on "Magnetic Concentration," of which John Birkenbine and Thomas A. Edison were the joint authors. The growing interest in the United States in the utilization of the leaner magnetic iron ores was dwelt upon, followed by a review of the general principles underlying the construction of the different machines brought before the public recently. *The Iron Age* has placed before its readers illustrated descriptions of two of them, the Edison and the Wenstrom, the latter having been since then modified to some extent. A machine of the new design has just been completed at Bridgeport, Conn., and is to be shipped to Port Henry, N. Y. The third type, that of the belt machine, is represented by the Conkling machine, a description of which was published in *The Iron Age*. Another belt machine is the Norton, which is being developed at Troy. The Buchanan magnetic rolls have been tested over a long period by the Cheevers at the Theall Mine, near Brewsters, N. Y. Messrs. Birkenbine and Edison submitted some data on the results obtained by magnetic separation.

This paper was followed by that of Pedro G. Salom, of Philadelphia, of the Julian Storage Battery Company, on "Electric Storage Batteries."

The Evening Session

had been announced as one especially devoted to iron and steel, and brought the largest and most appreciative audience which the institute has had for a long time. It was opened by the reading of a communication from C. P. Sandberg, of London, England,

ON RAIL SECTIONS.

After reviewing his own work, well known in this country through his own writings and those of others, Mr. Sandberg endorses all that has been said about the evil produced by wide, thin flanges, which have gone to the extreme in America, and trusts that it will meet with a speedy correction on the part of engineers by the designing of sections that can be

made harder—as hard as the old sections in the beginning of steel-rail making—to enable makers to regain the "lost art" which engineers now lament.

With reference to the second cause of inferior rails—namely, want of inspection, he states that everything depends upon the kind of inspection. Sometimes specifications are overdone and impracticable. In general the guarantee is not found to be of much value, practically speaking. Buyers prefer to be convinced of having got their money's worth before they pay for the goods.

While Mr. Sandberg uses the bending-test with sample-ingots, as a preliminary, chiefly to enable the maker to avoid rolling brittle steel into rails, which might break under the falling-test, Mr. Hunt is satisfied with such a preliminary test alone, and does not enforce any falling-test at all. What is more, in his specification the bending tests are repeated two or three times, with a chance of ultimately getting one to stand, and having the rails consequently accepted. Mr. Hunt is not the only one abolishing the falling-test or drop-test. Mr. Sandberg has reduced the so-called "barbarous" tests so as to admit of greater hardness; but he sees no cause to abolish them altogether.

In reference to the cutting off of blooms 12 inches at the top end, Mr. Sandberg says: Fully appreciating the importance of sound ends, I think such a heavy cut must entail great loss upon the maker; and, worse still, that it will not absolutely secure the object in view, inasmuch as hollow sinkings will not always be detected thereby. I would rather aim to obtain in casting a more solid top to the ingot, through the quality of the steel. To promote this I would tolerate more silicon, which makes the steel in casting very quiet, and permits hardly any gases to escape. From thousands of analyses I have found that with 0.10 per cent. of silicon a more solid top is obtained, while no material effect is shown in the testing for physical qualities. I could cite several works on the Continent using regularly as much as 1 per cent. of silicon; their ingots are as if they were planed on the top, and need only the cutting off of a 12-inch crop end of the rail; neither ingots nor blooms being cut at all. In this theory I know that I stand alone, both in Europe and in America, and am, therefore, quite prepared to meet with objections. My difficulty in practice is to obtain the silicon in uniform proportion. While I sometimes get accidentally 1 per cent., at other times I get next to nothing and then I get the hollow top. Regularity in the pig iron, as to its contents of silicon as well as its heat, would rectify these irregularities in the finished article. This would be well worth the makers' attention as a means to insure both economy to themselves and sound rail ends, and satisfaction to the consumer.

The third cause of inferior rails nowadays, as compared with those first rolled, namely, the driving, is perhaps the most important of the three, particularly because there is no help for it. To ask the maker to give more time to both the chemical and the mechanical processes would be regarded as a suggestion to return to the old stage-coach. Nevertheless, the fact is that no sooner is the pig iron in the converter than it is out as a rail. Any one having the least experience in chemical processes must know that time cannot be dispensed with, but is necessary for dissolving, precipitating and mixing, and for the due escape of the gases produced. Why is the Siemens-Martin steel more homogeneous than the Bessemer? Simply because time is given.

Again, in mechanical respects, the old mills, running at slow speed, produced a close grain in the rails, because the pressure was given in the stage of brown heat.

This made the rails physically hard. It explains why different wearing results might be got from the same chemical composition. One rail might be rolled at red heat and the other at brown or nearly black. The thick flanges formerly prevalent permitted such cold-rolling without consequent rejections or waste. Since the thin flanges, like razors, have come into use, makers have been actually bound to spin them out in quick-rolling mills, and the only part that gets cold-rolling is the flange, while the head is always coming out red hot. No close grain or physical hardness can be expected in the big heads—which is just the reverse of what should be the result sought.

However, it is of no use to ask makers to roll slow; at least not until engineers will return to thick flanges of say $\frac{5}{16}$ inch, $\frac{1}{2}$, rather, $\frac{3}{8}$ inch; and even then the ambition to turn out a rail a minute and so many tons out of a converter will not be given up. The only remedy hoped for is that, through the adoption of these thick flanges, the rail-steel might with safety be made harder chemically by admitting as much carbon (and silicon to give solidity) as the amount of phosphorus present will permit. It is in this view that Mr. Sandberg closes a paper recently read before the British Institution of Civil Engineers, with a suggestion of thick flanges and the use of steel base-plates, where the preservation of sleepers will necessitate a broader base than the rail-flange can practically give.

The second paper on the same subject was that of Frederic A. Delano, of Chicago, Ill., who is connected with the Chicago, Burlington and Quincy Railroad, from which we quote:

The designing of many rail sections by engineers who are far from being experts in the metallurgy of steel has led to the general acceptance of erroneous principles as the rules for such designs. Until very recently, it has been assumed that the more metal was put in the head to wear away the longer the rail would wear, and it has been the practice in adopting heavier sections to put all the additional weight on top of the rail-head of a very much lighter section. Careful investigation on a number of railroads has shown that of the rails weighing 65 pounds per yard and over the greater part have to be removed after comparatively trifling abrasion, solely, because they are no longer fit for a smooth track. This is evidence of error in the principles of the design of the section.

It is generally admitted that, as a rule, rail sections designed since 1879 for rails of 65 pounds and over have not given entire satisfaction. There are several reasons which may account for this: first, a constant increase during this period of wheel-loads on engines and cars, together with generally higher speeds; secondly, new methods in manufacture, cheapening the cost of production and possibly producing an inferior article; thirdly, mechanical conditions in the rail itself due to the shape of the rail section.

1. The first cause is undoubtedly a real one. I think there is evidence that the elastic limit of much of the rail-steel now in use is actually often exceeded by the strains of practice, causing a flow of metal, which is then abraded by the wheel flanges; and the result is a kinking or a battering of the rail, which condemns it for a good track. Granting the existence of this cause, there are two ways of ameliorating the result; one is to increase the bearing surface of wheels on rails; the other, to raise the elastic limit of the metal, which subject I shall take up later on.

2. With regard to the second cause, it is held by many that the enormous production, low cost, and "improvements" induced by competition have involved

inferior quality of product. Many well-informed men are content to rest on the simple assertion that the old John Brown steel gave remarkable satisfaction, because it was made of a good iron and did not contain more than .08 per cent. of phosphorus, any analysis showing more being grossly inaccurate. If they are satisfied that this is the solution of the problem of making a really good rail, why do they not try their .08 per cent. of phosphorus? Low-phosphorus steel can be made to-day with more certainty and at less cost than ever before. The only question is whether the elimination of phosphorus is going to be worth what it costs. The fact that as many Bessemer charges are now blown in one hour as were formerly blown in a day is pointed at as evidence that the same care cannot be given to the operation; but I think men really conversant with the turning out of a large product will maintain that almost absolute regularity in the iron is necessary to keep things running with the clock-work regularity required for such a rate of production. Indeed, large product and general smoothness in mill-operation are, to my mind, an indication of a uniform product, so far as metal in the rail itself is concerned, and seem to me, therefore, not objectionable on that score. With the rapid rolling, however, particularly the rapid blooming or breaking-down of large ingots, I find fault.

3. That mechanical conditions in the rail itself, due to the general design of the rail section, can have any important effect on the service-value of rails has not been generally admitted, so I wish to lay particular stress upon this cause and attract to it the recognition it deserves. Speaking in general terms, that form of rail is, in my opinion, faulty, which has a deep massive head, a wide, thin base and a thin web, connected to the head and the base by small fillets only. The objection to this form and the advantages which might be obtained by different proportions may be concisely enumerated as follows:

a. Such a form necessitates rolling at a higher temperature, and, what is of chief importance, finishing at a higher temperature than permits the securing of a well-forged, compact rail.

b. This type of section probably encourages the use of a higher percentage of manganese to reduce the number of second-quality rails; and this production of second-quality rails, as well as the additional manganese, figure in the cost of the rails to the consumer.

c. Rails with heads out of proportion to the rest of the section require a great deal more of cold-straightening, because it is impossible to know how much bending or cambering such a rail needs in its hot state in order that it shall cool straight. This is certainly a very important consideration.

d. The same sort of disproportion must produce corresponding disproportions in the rate of cooling, causing internal strains, which are only partly dispersed or effaced by the small connecting fillets.

e. A section having these internal strains exaggerates the effect of any impurity which may chance to have segregated in the ingot, while a section not liable to these strains would safely admit of a generally higher carbon steel, as well as a considerable latitude in composition.

f. It is not economical to provide for an abrasion of some $\frac{1}{4}$ of an inch, or even more, from the top of the rail, if it is found that rails have failed long before this amount has been abraded. Instead of providing more height to wear away, we can do better by providing more breadth of bearing-surface, and metal of a higher resistance within the elastic limit.

g. Inasmuch as the funnel-shaped cavity, dispersed blowholes and possible impurities exist in the ingot in the axis of its length, it follows that these defects will

exist (especially in rails made from the upper part of the ingot) on an axial line which passes through the rail-section. It follows that if the rail-section has 50 to 55 per cent. of its metal in the head, the poorest metal is inclosed in the head, where it receives the least amount of forging; whereas, if the amount of metal in the head does not exceed 40 to 45 per cent., this poor metal occurs in the thoroughly-worked web portions.

The foregoing objections seem to be so formidable and convincing that I am glad to see a general tendency among all the later investigators to come to the same conclusions. It seemed to me that rail-sections should be made to certain definite proportions, regardless of the weight per pound. It is often said that the larger sections will admit the use of a higher carbon steel; but this assertion requires the proviso that the heavier section shall be similarly proportioned. One 74-pound section which I have in mind could not be safely made of as high a carbon steel as the 62-pound section from which it has been schemed.

The specifications which I append as a conclusion to these brief remarks may be of interest to some, as being different in several particulars from any other rail specifications. They were drawn up originally 15 months ago, and have not been changed in any important particular since that time.

Proposed Specifications for Steel Rails.

1. The steel used in the rails shall be made by the Bessemer or by the open-hearth process, and shall not contain more than 12-100 of 1 per cent. of phosphorus, as determined by an analysis made from a boring into the center of metal of the rail-section of any rail.

2. The ingots shall be poured with care, and the molds filled at one pouring, without undue spattering of the sides. No sand or water shall be thrown upon the ingots after pouring; but, on the contrary, coke or charcoal dust shall be used. In no case shall rails made from a chilled heat or a bled ingot be accepted as first-quality rails.

3. Cold molds or molds in such shape as to require more than a hand-sledge to free them from the ingot shall not be used.

4. It is preferable that ingots, when taken from the pit, should be kept erect and so heated; but if this is not the practice of the rolling mill company the ingot shall not be laid on its side until it is certain that the central part has solidified.

5. Blooming rolls of 40 inches from center to center shall not be driven at a speed exceeding 30 revolutions per minute, and larger or smaller rolls shall not be driven at a speed exceeding this in linear velocity. (The linear velocity of an ingot going through the first or 18-inch pass of a pair of 40-inch rolls, driven at a speed of 30 revolutions per minute, would be about 205 feet per minute.)

6. No metal shall be cut from that end of the bloom which corresponds to the "butt" end of the ingot.

7. From that part of the bloom which corresponds to the top of the ingot an amount shall be cut equaling in pounds the area of the mean cross-section of the ingot in inches, or as much more as is necessary to secure a sound pipe, free bloom.

8. The number of the charge shall be stamped distinctly on each rail, and the place and date of manufacture rolled on.

9. The section of rail rolled shall conform to the template, and a variation of more than a scant $1\frac{1}{32}$ inch over or under the template height shall not be allowed, and the rail must be made close enough to template to fit properly in the splice.

10. The weight of the rails per yard shall be kept as close to the standard weight per yard as can be after complying with the conditions of Clause 9.

11. The rails shall be drilled for the bolts of the splice-bar, or, if necessary, notched in the flange, in accordance with the templates and diagrams furnished by the railroad company.

12. The rails shall be cut at right angles to their length, and be at 60° to 70° F., within $\frac{1}{4}$ inch of the standard length of 30 feet. No shorter length rails shall be accepted by the railroad company, except under special provisions of this contract for such acceptance.

13. Rails shall be perfectly straightened in both surface and line, and without any twists, waves or kinks. Particular attention shall be given to having the rails free from "camber," in which the ends droop, and also free from any flaws, cracks or excessive roughness.

14. The rails shall be finished at such a temperature that it will not be necessary to allow more than 4 inches for contraction on every 30-foot rail sawed immediately after coming from the finishing-pass in the rolls.

15. One rail-end, which must correspond to what has been the ingot top, shall be tested for each heat or charge by a drop-weight of 1 gross ton falling 10 feet on the rail-head, midway between the supports, 3 feet apart. (The bearings are to be of iron or steel, fastened firmly to oak framing constructed of oak timbers bolted together into a solid floor, and this supported on masonry foundations not less than 4 feet deep. The guides are to be smooth, straight and parallel.) Should one rail-end be broken by the above test, two similar rail-ends must succeed in enduring the shock, or else cause the rejection of all rails in that same heat. It is expressly desired that the rail steel shall contain as high a percentage of carbon as the maker is willing to put in and still produce rail which shall endure this drop-test.

16. The representative of the railroad company shall at all times be allowed, on request, to see the *bona fide* analyses and carbon determinations, as made by the rolling-mill company, of the steel used in making these rails.

W. R. Hunt, of Chicago, followed with a paper on the same subject, prefacing it with a reply to the criticisms raised in Mr. Sandberg's communication. Mr. Hunt, starting from the conviction that high heat during the manufacture of the rail and a good product cannot go together, has reached the conclusion that the sections of the rail must be so designed that they can be made successfully at a lower temperature. The earlier rails, which gave such good results, were all of light sections, and they were almost all rolled at a lower heat. It was long supposed and it is still widely believed that chemically the metal in the older rails was superior to that now used. Mr. Hunt quoted a number of analyses of the famous John Brown rails, which showed an astonishing range of chemical composition, the only element present in relatively uniform quantities being manganese. The facts given prove that it was not the character of the metal itself, but the method of manufacture, rolling at a lower heat and with greater roll pressure. The metal was more thoroughly worked. Mr. Hunt, as the result of his wide experience in the manufacture of rails and his close study of the subject, submitted a series of designs of rail sections, the principal characteristics of which were a relatively shallow head and thicker web and flange. He submitted drawings of these designs, the character of which is indicated by the following distribution of metal in the head, web and flange for rails of different weights:

Distribution of Metal.

	Head.	Web.	Flange.
1.—60 pounds.....	41.67	21.11	37.22
2.—65 pounds.....	41.60	21.40	27.90
3.—70 pounds.....	41.62	20.55	37.88
5.—75 pounds.....	41.72	20.96	37.32
6.—80 pounds.....	41.95	21.21	36.34
7.—80 pounds.....	40.00	21.22	38.78
8.—85 pounds.....	43.43	21.29	38.38

No. 1 was specially designed with the idea of making it so that the rail will require the least amount of cold-straightening. No. 7 is a rail greater in height than usual. No. 8 is what Mr. Hunt would suggest as the future rail. Any of the sections can be rolled on existing mills without unduly heating the steel.

The discussion was opened by P. H. Dudley, who pointed out that the 80-pound section was quite similar to that designed by Mr. Dudley for the New York Central Railroad in 1883, a fact which Mr. Hunt admitted to be correct, and the omission of which was due to oversight. A running discussion took place between Mr. Hunt, John Fritz, of the Bethlehem Iron Company; E. C. Pechin, of Cleveland; Dr. Raymond, H. M. Howe, R. Chauvenet and others, chiefly on the question of the character of the pig iron. The majority of the speakers attempted to obtain a definite specification for the chemical composition of Bessemer pig capable of producing good rails, while Mr. Hunt confined himself to

the general reply that the iron is the better the purer it is, the nearer it comes to pure iron and carbon.

The Thursday morning session opened with the presentation by C. Kirchhoff, Jr., of three communications from members of the institute on the subject of

OIL AND METALLURGICAL FUEL,

the metallurgists reporting being G. H. Billings, of Boston; E. C. Potter, of the North Chicago Rolling Mill Company, and E. C. Felton, assistant superintendent of the Pennsylvania Steel Company, Steelton, Pa. The first named presented the following data as the result of his experience with

COAL VS. OIL IN PUDDLING.

Starting with everything cold, we used 3518 pounds of oil to get the furnace in condition to charge a heat. After charging we ran until we got out 13,340 pounds of puddled blooms, using 8437 pounds of oil. One gallon of oil weighs 6.328 pounds, and 8437 pounds of oil would equal 1333 gallons of oil, which, at 4 $\frac{1}{2}$ cents per gallon, would cost \$65 (the expense of making 13,340 pounds of blooms). The expense for making one ton of blooms with oil would be \$10.909. As we make 5.70 tons in 24 hours, the expense for using oil as fuel for one day would be \$62.18.

Assuming that one ton of blooms can be puddled with 1.5 tons of coal, this at \$4.875 per ton, would cost \$7.31, and 5.7 tons, or a day's work, would cost \$41.68. As it costs \$62.18 per day using oil and \$41.68 per day using coal, we show a saving in favor of coal of \$20.50 per day. Having used 3518 pounds of oil to get the furnace hot and to make bottom, this is not included in the above calculation. Usually we only have to light the furnace, but in this instance the furnace had been repaired, and a new bottom had to be made, which required the quantity of oil necessary to make three heats of blooms, or 2109 pounds, which, deducted from the 3518 pounds, leaves 1409 pounds of oil. As this quantity must be expended every week in lighting up, it should be divided by 6 to apportion it to each day: 1409 pounds divided by 6 gives us 234 pounds of oil for each day, which, at 4 $\frac{1}{2}$ cents per gallon, or .0075 per pound, would cost \$1.75 per day, and as we worked 1.2 days the cost would be \$2.10, which, added to \$62.18 (the cost of using oil for fuel for one day), gives us \$64.28, the actual cost per day for the use of oil for fuel. As it costs \$41.68 using coal as fuel and \$64.28 using oil as fuel, we show a saving in favor of coal of \$22.60 per day, and for 300 days, or one year, we would save \$6780 on this furnace. The customary amount of coal used for puddling iron is ton for ton, which would make the saving one-third greater, or \$9040 per year.

The cost of using oil for one week in a puddling furnace was found to be as follows: Starting with everything cold, we ran the furnace six days. We used 6602 gallons of oil and produced 65,595 pounds of blooms: 6602 gallons of oil at 4 $\frac{1}{2}$ cents would cost \$321.83. As we have to pay \$24 for extra labor, this makes the total cost \$345.83, or \$11.81 per ton. Assuming that 1 ton of blooms can be puddled with 1.5 tons of coal (which, at \$4.875 per ton, would cost \$7.31), it would cost to puddle 65,595 pounds of blooms \$214.06, so that we show a saving of \$4.50 per ton, or \$131.77 per week, or \$6852.04 per year, by using coal instead of oil for fuel. Besides this, on a puddling furnace using coal we would have a boiler from which we would generate steam by the waste heat in value equal to, say, one-half of that which we can make by the direct use of coal, or 4200 pounds per turn, or for 11 turns, or a week's work, 46,200 pounds of coal, which, at .00217 per pound, would cost \$100.25 per week, which,

added to \$345.83, the cost for oil, gives us \$446.08, from which we subtract \$214.06, the cost of making same quantity of blooms by using coal. We get a saving of \$232.02 per week, or \$12,065.04 per year, by using coal instead of oil.

Cook vs. Oil in Raising Steam.—The following is the record of the first day, starting with everything cold. We used 2910 pounds of oil to evaporate 15,600 pounds of water. One gallon of oil weighs 6.328 pounds, and 2910 pounds of oil would equal 459.86 gallons, which, at 4 $\frac{1}{2}$ cents, is \$22.42 (for 10 hours). As these boilers run night and day, 24 hours, at \$22.42 per shift, would cost \$52.81, and 300 days, or one year, would cost \$16,143 under one boiler. As we have three boilers, the expense of using oil would be \$48,429 per annum. Assuming 1 pound of coal would, under the same circumstances, evaporate 9 pounds of water, it would take, to evaporate 15,600 pounds of water, 1733.33 pounds of coal; this, at \$4.875 per ton, or .00217 per pound, would cost \$3.76 for 10 hours. For 24 hours, at .376 per hour, it would cost \$9.024, and for 300 days, or one year, it would cost \$2707.20, the expense for one boiler. For three boilers it would cost \$8121.60, thereby showing a saving over coal of 38 men in 24 hours, which, at an average price of \$2 per day, would be \$78 per day.

With the brief experience we have had with oil as fuel we find that the efficiency of the boilers is somewhat increased and the repairs materially lessened. The perfect cleanliness of the fuel and the ease and simplicity of supply and regulation, together with the steadiness and uniformity of steam supply, make it, for our business at least, a most desirable substitute for coal.

We have made no evaporation tests of any kind, the only test of its efficiency being the fact of its keeping our works running to their fullest capacity. This we find it will do, which cannot be said to be true of coal with our present boiler capacity.

The third series of data came from E. C. Felton, assistant superintendent, and dealt with the results obtained with

OIL AT THE PENNSYLVANIA STEEL COMPANY.

All oil used vaporized in the Archer producer, an apparatus for mixing oil and superheated steam, and heating the mixture to a high temperature, $\frac{1}{2}$ to $\frac{1}{4}$ pound peat coal to gallon oil used to generate heat.

First Trial.—Heating hot ingots in two Siemens' heating furnaces in the blooming mill, six 14-inch ingots being a charge. The oil used was partially refined, paraffine and a part of the naphtha being removed. It was first put on in March, 1888. Six weeks' run, including the oil necessary to keep the furnaces hot over Sunday, showed a consumption of oil about 6 $\frac{1}{2}$ gallons to 1 ton of blooms.

Second Trial.—Melting on 30-ton open-hearth furnaces, the materials being cold scrap and pig and iron ore. The same oil as above was used. The gas was carried 300 feet from the producer to the furnace. One month's run showed the use, including keeping the furnace hot over Sunday, of 48 gallons oil per ton of ingots.

Third Trial.—Six Siemens' heating furnaces in the blooming mill were fired with Lima oil. The gas was put on June 11, 1888, and has been used since constantly. The average for last six months, including Sundays and heating some cold ingots, was about 6 gallons oil per ton of blooms. This amount varies with product of mill. Under the most favorable conditions, hot ingots and all the stock which the furnaces can handle, the consumption of oil is 4 $\frac{1}{2}$ to 5 gallons per ton of blooms. Cold ingots require about three hours in the furnace.

Fourth Trial.—A 30-ton open-hearth furnace was heated with Lima oil, the producer being near the furnace. Six weeks' run showed a consumption of 54 gallons of oil per ton of ingots, including Sundays and starting the furnace. The best week's record was 46.7 gallons. The loss proves

and coal at \$2.15 per ton, we have the cost of oil, \$1.93, as equivalent to coal at \$2.15, making a net saving of 22 cents per ton.

In December, 1888, the rail-mill battery of 26 boilers, of the same dimensions as those in the converting department, was equipped for fuel oil. For the week ending January 5, 1889, with a rail output of 5208 tons, 5987 barrels of oil were consumed, as against a necessary consumption of coal to do the same work of 1805 tons, showing 3.31 barrels of fuel oil to be equivalent to 1 ton of Indiana block coal, which, with the costs named above, would show \$1.98 worth of fuel oil to be equal to \$2.15 worth of coal. The labor required to operate the rail-mill boilers for 24 hours is as follows with coal as fuel: 26 stokers, 4 water-tenders, 6 ash-wheelers, 12 men unloading coal, making a total of 48 men. With oil as fuel the following men operate the same battery for 24 hours: 4 water-tenders, 6 men to attend to the burners, making a total of 10 men, a saving over coal of 38 men in 24 hours, which, at an average price of \$2 per day, would be \$78 per day.

With the brief experience we have had with oil as fuel we find that the efficiency of the boilers is somewhat increased and the repairs materially lessened. The perfect cleanliness of the fuel and the ease and simplicity of supply and regulation, together with the steadiness and uniformity of steam supply, make it, for our business at least, a most desirable substitute for coal.

We have made no evaporation tests of any kind, the only test of its efficiency being the fact of its keeping our works running to their fullest capacity. This we find it will do, which cannot be said to be true of coal with our present boiler capacity.

CRUDE PETROLEUM AS FUEL FOR RAISING STEAM.

Fuel oil was first substituted for coal at the South Chicago works of the North Chicago Rolling Mill Company, in September, 1888, and was first applied to the battery of boilers in the converting department. This battery consists of 14 tubular boilers, 15 feet in length by 5 feet in diameter. To operate these boilers with coal, the following men were required for 24 hours: 14 stokers, 3 ash-wheelers, 6 men unloading coal, 2 water-tenders, making a total of 25 men. With fuel oil the following men are required to operate the same boilers: 2 water-tenders and 4 men to attend to the burners, making a total of 6 men. This gives a saving of 19 men by the use of fuel oil in place of coal, which at an average price of \$2 per day each would give a saving of \$38 per day. Comparing the consumption of fuel oil with that of coal, we find that for the week ending January 5, 1889, with an ingot output of 6403 tons, 2731 barrels of fuel oil were used, as against a necessary consumption of coal for the same work of 848 tons, showing 3.22 barrels of fuel oil to be equivalent to one ton of Indiana block coal. Figuring oil at 60 cents per barrel

to be somewhat greater than with coal gas, and some trouble was experienced by the clogging of the checkers with fine particles of oxidized iron.

Fifth Trial.—Melting in a 5-ton open-hearth furnace since October last showed a consumption of 50 to 55 gallons of oil per ton of ingots.

Sixth Trial.—Raising steam under two return flue tubular 100 horse-power boilers. The best 12 hours' work showed 16 pounds of water evaporated by 1 pound of oil; the average was about 12 pounds water per pound oil, the temperature of the feed-water being about 160°. The use of oil is not so economical as peat coal.

Seventh Trial.—Oil is being used in a reverberatory furnace for heating cold blooms. The trial is now in progress and is not far enough advanced to report results.

During the discussion which followed R. W. Hunt, of Chicago, reported that when he was in charge of the Troy works an experiment was made with the Hayden apparatus for burning oil. One of two Swindell furnaces was fitted up with it, while a second furnace, identical in construction and in capacity, remained unaltered. Both were serving an 18-inch mill. The petroleum used cost 4½ cents at that time, while the Westmoreland coal cost \$4 per ton. Records kept over a period of three months, under practically identical conditions, showed that if oil could be had at 3 cents a gallon there would be a saving of 50 cents per ton.

J. M. Sherrerd, of the Troy Steel and Iron Company, referred briefly to the experiments now being made at that plant, conditions having considerably changed. The use of oil has been eminently successful in Troy in connection with its use to fire the boilers of the furnace plant when the gas supply happens to be inadequate. Under these conditions oil possesses the great advantage of responding quickly at a time when a prompt supply of steam is particularly needed. Mr. Sherrerd stated that the entire oil consumption for the blast furnace boilers was 1500 gallons in a month, in which time the furnace produced 5900 tons of pig iron.

Dr. R. W. Raymond called attention to an obstacle to the introduction of oil as a fuel, giving as an instance the experience with it at the works of Cooper & Hewitt, at Trenton, N. J. Oil was introduced in one of the puddling furnaces, the result being that heats could be got out faster. The puddlers were paid a lump sum for boiling, they paying helpers. Although the introduction of oil assured to them increased earnings, they declined to make a reduction in the price representing partially the saving of wages to laborers and helpers, on the ground that it would be depriving the latter of work.

The president, Professor Potter, stated that experiments at a large works in St. Louis had shown that oil at 3 cents, the price then ruling, is equivalent to \$2 coal. But as coal costs \$1.37½, delivered, oil is too dear to use. In some instances where cleanliness and a clear fire are particularly desirable oil is preferred. Thus the St. Louis Shovel Company have adopted it for their forges.

Prof. W. P. Blake, of New Haven, spoke on

THE COPPER DEPOSITS OF COPPER BASIN, 30 miles southwest of Prescott, Ariz. The copper occurs chiefly as malachite and azurite in sandstone boulders, which overlie a granite formation. Erosion has removed parts of the sandstone deposit, leaving abrupt banks flanking both sides of the valley. The occurrence is very showy, the entire sandstone belt being a mass of green ore with streaks of blue azurite. The copper contents are not so high, however, as the appearance of the sandstone would seem to justify, since the

malachite and azurite generally are merely thin incrustations of the grains, pebbles and boulders of which the rock is composed. The percentage of copper ranges from 5 per cent, up to 20 per cent., the average being about 10 per cent. In the granite, through which course a number of dikes, are a large number of seams and veinlets, carrying red oxide in the center veneered with malachite. Besides, the granite contains, finely distributed through it, copper pyrites. Professor Blake traced in a very interesting manner the connection between the metaliferous contents of the granite and the ore in the sandstone, showing how strong is the evidence in favor of the theory that the origin of the latter is to be found in the older rock. Professor Blake touched also upon the question of the extraction of the metal from the ore. Its high silica contents, the absence of proper fluxing material and the high cost of fuel have led to the abandonment, at least temporarily, of the plan of smelting in the district, although a furnace is partially completed. Professor Blake suggests extraction by means of dilute sulphuric acid and precipitation electrolytically. The acid he proposes to manufacture from auriferous pyrites, the residues of which, after burning, are to be chlorinated for the extraction of gold.

Following Professor Blake, Henry J. Williams, of Pittsburgh, presented a paper on the "Determination of Silicon in Ferro-Silicons and a Study of Its Reactions with Alkaline Carbonates." During the brief discussion the principal subject became the graphitoidal form of silicon, and the presence of 2 to 3 per cent. of silicon in the greater part of the aluminium of commerce.

The afternoon session was devoted exclusively to the report of the council and to the discussion of questions relating to the policy of the institute. The usual banquet took place at the Hotel Brunswick in the evening.

On Friday morning the members inspected the Stevens Institute of Technology, and held a meeting there, the first paper being a brief note from Prof. W. P. Blake on the storage of water in Arizona, dealing principally with the large dam at Walnut Grove, Yavapai County, Arizona. E. G. Spilsbury, of the Trenton Iron Company, Trenton, N. J., described and showed samples of the new locked-wire rope, an English invention which the company have begun to introduce. Oberlin Smith, of the Ferracute Machine Company, Bridgeton, N. J., showed samples of the tin nail made from scrap tin plate, to which we have already referred in the columns of *The Iron Age*. He traced the development by which the special machinery was brought to its present form, making from 30 to 90 nails a minute. F. A. McDowell gave an account of the work of uncovering the roof of the Tilly Foster mine, illustrating it with a very fine series of stereopticon views. Professor Denton, of the Stevens Institute, presented the last paper of the meeting, on the work of air compressors.

At the invitation of Professor Morton, president of the Stevens Institute, the members enjoyed the hospitality of his house, scattering afterward into small parties to visit different points of interest. Saturday was devoted to an excursion by river boat to the works of the Central Forge Company, at Whitestone, L. I., to the torpedo station at Willett's Point, and to Fort Hamilton, where Captain Zalinski explained the operation and fired the famous dynamite gun of which he is the inventor.

The Crane Iron Company, at Catasauqua, Pa., are experimenting with an ore concentrator invented by the superintendent of the company

Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., February 26, 1889.

The attitude of Chairman Mills, of the Committee on Ways and Means, on the Cowles Tobacco-Tax Repeal bill, amended, reported from the Committee on Appropriations, practically puts an end to all prospects of revenue reduction by this Congress. Having been voted down by an overwhelming majority on his Senate substitute constitutionality proposition he has announced his determination to prevent action on the internal revenue movement by means of filibustering. Speaker Carlisle has agreed to recognize Mr. Randall for the purpose of taking up the bill from his committee, but he says that he will also recognize Chairman Mills on his dilatory motions and will vote against the bill if it comes to a vote. There are fully 70 Democrats who are with Mr. Randall on the measure reported from his committee, and will follow his leadership if the opportunity be offered.

There has been considerable canvassing among the Democratic Representatives in hope of persuading Chairman Mills and his friends to abandon their determination to obstruct revenue legislation and to permit the tobacco-tax repeal to go through. Chairman Mills says that not to oppose the Cowles bill would be to surrender their whole position and abandon the doctrines of the St. Louis platform and the President's Message. He thinks that a contest is necessary in order to keep the party in line with the doctrines of a large majority of its own members. Should the Cowles bill get through the House it will be difficult to put it through the parliamentary routine of the Senate, as all the appropriation bills have not been disposed of.

In the House it is not Mr. Randall's purpose to call up his bill until the appropriation bills are finished. The larger share of the attention of the two Houses of Congress is so much absorbed and diverted by the approaching inauguration of the President-elect that it is difficult to press any measures except such as are indispensably necessary to the administration of the Government.

There has been considerable subsidence of extra session talk since the new States have been admitted. It will remain to be seen whether the reduction of the surplus revenues will be regarded by President Harrison as a sufficient reason for the calling of Congress into extra session.

OBITUARY.

COL. DAVID F. HOUSTON.

Col. David F. Houston, general manager of the Crozer Steel and Iron Company, at Roanoke, Va., and a member of the State Senate of Virginia, while on a visit to his cousin, Robert J. Houston, at Lancaster, Pa., on February 16, slipped and fell on the icy pavement, rupturing a blood vessel, and dying from hemorrhage in a few minutes. The deceased was a member of a prominent family of Eastern Pennsylvania. He achieved an honorable name as a soldier and as an intelligent and enterprising business man.

HENRY MC SHANE.

Henry McShane, senior partner of the house of William McShane & Co., manufacturers of plumbers', steam and gas fitters' supplies, and having headquarters in Baltimore, New York, Boston, Brooklyn and Washington, died suddenly at his residence, Mount Washington, on the 23d inst.

TRADE REPORT.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Pa., February 28, 1889.

Pig Iron.—The market does not show much buoyancy, but there are some indications of a reaction from the depression of the past two or three months. Holders have fixed their mind on prices which they appear to have determined shall be their minimum, and as consumers are confronted with absolute firmness, the conviction is gaining ground that as prices are not likely to be lower, there is no risk in placing orders at current rates. The tendency, therefore, is to select the best brands, so that in this direction, at all events, an early improvement is not improbable. There is plenty of Iron at from \$17 to \$18 delivered, for No. 1; \$16 @ \$17 for No. 2, and \$15.25 @ \$15.75 for Gray Forge. It is not every consumer that can afford to risk such qualities as may be available at the inside quotation, and by the same rule only standard and tried qualities command the outside figure. However, it is usually considered a good feature when prices can be quoted with confidence, and with the extreme variations limited to 50¢ or \$1 per ton, and this, we believe, may be done to-day, allowing a little more for premium on three or four brands, which are too well known to require specific mention. The feeling, therefore, may be regarded as very steady, and if similar reports come from the West, the trade are inclined to expect some good buying within the next couple of weeks. Things are not at a standstill by any means, but buying has been of that unsatisfactory character that it was impossible to form any definite idea as to its continuance. Orders were sent from time to time, according to immediate requirements, but nothing was taken for more than 30 days ahead. The consequence is that the majority of consumers have little or no Iron in their yards, so that they must buy if they intend to keep their hands employed. Should the outlook improve and prices show a firmer tendency, orders would double up at once. There is not much chance for materially higher figures, of course, but on a dull market buyers get various advantages which are not to be had when the turn is in the other direction. Hence, if buyers once get the idea that the market is on rock bottom, it is not much of a step to increasing activity, and from that to better prices. With so large a production, and with more or less uncertainty in regard to consumption, the disposition still is, in the majority of cases, to operate cautiously, although, as already stated, the conviction is becoming general that the lowest point of depression was passed two or three weeks ago, and the trade is disposed to regard the outlook as more encouraging than for some time past.

Foreign Iron.—There is nothing doing, although asking prices are firm at last week's quotations, viz.: Bessemer, \$19.50 @ \$20, c.i.f., duty paid. Spiegeleisen, \$28.25 @ \$28.50, c.i.f., duty paid, for 20%.

Blooms.—A good demand is reported at quotations as follows: \$28 @ \$28.50 at mill for Nail Slabs; \$29 @ \$30 for Sheet Iron Billets; \$30 @ \$31 for Soft Tank, and \$35 @ \$36 for Flange purposes; Charcoal Blooms, \$52 @ \$54; Run-out Anthracite, \$41 @ \$42.50; Scrap Blooms, \$32 @ \$33 per "Bloom" ton of 2464 lb.

Muck Bars.—The demand is slow and prices irregular and unsettled. Some parties are offering Bars at \$26.50 @ \$27, delivered, while others ask \$27 @ \$27.50,

but in ordinary cases \$27 is considered a full quotation, although a sale was made as high as \$28 a few days ago for a special quality.

Bar Iron.—The demand for Bars is very unsatisfactory; large orders being scarce leaves little beyond a small day-to-day trade, which is barely sufficient to keep the mills employed on single turn. There are no inquiries from large consumers, and for the present prospects are not encouraging, although it is thought that with the incoming month business will probably take a new start. Country mills are said to be doing fairly on local orders, but prices are so low that there is no margin for profit, and in many cases it is thought that actual cost is not realized. Skelp orders are scarce, too, so that manufacturers feel very much discouraged. Prices are irregular, and Bars are quoted all the way from 1.70¢ to 1.85¢, according to circumstances. Skelp is nominal at 1.75¢ for grooved and 1.85¢ @ 1.9¢ for sheared, but no recent transactions are reported.

Plate and Tank Material.—The feeling in this department is very despondent. There is a fair amount of business doing, but Steel is so largely called for and is quoted at such low prices by Western mills that local concerns have scarcely a chance when a large order is involved. It is said that both bridge and ship builders will be heavy buyers some time next month, but with such a scarcity of work it will require a great deal of business before prices show much improvement. Nominal quotations are as follows: 1.90¢ @ 2¢ for Ordinary Plates and Tank Plates, 2.1¢ @ 2.2¢ for Universal Plates; Shell, 2.4¢ @ 2.5¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank and Ship Plate, 2.1¢ @ 2.25¢; Shell, 2.7¢; Flange, 3¢ @ 3½¢; Fire-Box, 3½¢ @ 4½¢. P. S.—An order for about 6000 tons is to be placed on the market in a day or two, chiefly for Plates and Angles, all Steel

Structural Iron.—Orders for large lots are still in the future, and what little work is going on is chiefly on old contracts. Those directly engaged in this department say that a heavy demand may be regarded as certain, although it may be some time yet before it comes on the market. Financial arrangements have to be settled before anything can be done, but in the present easy condition of the money market there is not much doubt on this point, although there may be more or less delay in carrying them through. Meanwhile mills are only partly employed, and therefore quote low figures on anything that will tide them over until things improve. Quotations nominally as follows: Bridge Plate, 2¢ @ 2.1¢; Angles, 1.95¢ @ 2.5¢; Tees, 2.4¢ @ 2.6¢; Beams and Channels, 2.8¢ for Iron or Steel.

Sheet Iron.—The demand is as good as can be expected at this season, and as a rule mills are getting a fair amount of work. Specialties are in very good demand, and the general report is rather more favorable than in other departments. Prices are about as follows for the best makes:

Best Refined, Nos. 26, 27 and 28....	3 @ 3½¢
Best Refined, Nos. 18 to 25....	3½ @ 3¢
Common, ½¢ less than the above.	
Best Bloom Sheets, Nos. 26 to 28....	4½ @ 4½¢
Best Bloom Sheets, Nos. 22 to 25....	3½ @ 4¢
Best Bloom Sheets, Nos. 16 to 21....	3½ @ 3½¢
Blue Annealed.....	2.6 @ 2.8¢
Best Bloom, Galvanized, discount.....	.62½ %
Common, discount.....	.67½ %

Steel Rails.—As regards this market there is very little to report. Small lots are being taken at quoted rates, but large orders are scarce. The feeling is hopeful, nevertheless, as manufacturers feel somewhat confident that the demand will ultimately develop into a good deal larger business than that of 1888. The demand for Steel

in other shapes also helps them out considerably, so that, while the immediate demand for Rails is poor, the chances appear to favor improvement. Prices are fairly steady at from \$27.50 to \$28, at mill, according to size of order, time for delivery, &c.

Old Rails.—Nothing doing in spot lots, which are held at \$24 and upward, or at \$23.50 for shipments. Sales for delivery at interior points are being made at from \$24 to 24.75, with a fair inquiry at inside figure.

Scrap Iron.—There is a little more demand, and prices are steady at about the following quotations: \$20 @ \$20.50 for cargo lots; \$21 @ \$21.50 for carload lots, delivered, or for choice \$22; No. 2 do., \$14 @ \$15; Turnings, \$13 @ \$14; Old Steel Rails, \$20 @ \$21; Cast Scrap, \$15 @ \$16; do. Borings, \$9 @ \$10; Old Fish Plates, \$23 @ \$24; Old Car-Wheels, \$17 @ \$18, Philadelphia.

Wrought-Iron Pipe.—There is not much doing for immediate delivery and prices for such are unsettled, and for desirable orders somewhat easier. The demand for large Pipe promises to be very large during the spring months, but financial arrangements are not far enough advanced to permit of the orders being definitely placed on the market. For the ordinary run of business nominal discounts are about as follows: Butt-Welded Black, 55%; Lap-Welded Black, 65%; Butt-Welded Galvanized, 45%; Lap-Welded Galvanized, 55%; Boiler Tubes, 62½%.

Nails.—Business is unusually quiet, and very little interest is manifested in it, beyond each mill retaining its own line of trade. Store lots are quoted \$1.90 @ \$2, and while there are plenty of cheaper Nails in carload lots very few seem to be wanted. The feeling among manufacturers is a little better, and efforts will be made to maintain remunerative prices when the spring trade opens.

Cleveland.

CLEVELAND, February 25, 1889.

Iron Ore.—Inquiries from consumers are now coming in quite freely, and offers are known to have been made for Ore in large quantities. Until, however, the mining companies establish formal quotations no active buying movement is looked for. Neither the mine owners or the furnace men can explain the delay in opening the market. Prices have been practically determined, and many buyers are of the opinion that the total output of the mines will be taken. These conditions would seem to warrant an immediate beginning of business, but the only activity now discernible is confined to the exchange of letters, in which the amount of Ore likely to be consumed is more frequently discussed than the question of prices. Apprehensions regarding Bessemer Ores have been in some degree removed by continued favorable reports from the Rail manufacturers. Eastern furnace men have been offered Ore within the past week on favorable terms, and it is quite probable that the first heavy sales will be in that direction. Vesselmen are still quite confident of being able to maintain last season's schedule of lake freights, but everything indicates the contrary. It has been announced during the past week that the \$1.25 charters from Ashland to Cleveland cover 125,000 tons of Ore. The permanent rate from the head of Lake Superior to Cleveland will likely be \$1.40, a rate that not only means fair profits to the mine owners, but permits the vesselmen to earn fair dividends upon their investments. All of the mining companies are waiting for the Republic, Champion, Cleveland and Chapin mines to fix prices, after which business will go forward with a rush. A

half dozen small lots of Ore on the docks have been sold during the week at \$4.20 for non Bessemer Hematites, and \$4.15 @ \$4.20 for non-Bessemer Menominee. About 27,000 tons of Ore have been shipped to the furnaces since the last report.

Pig Iron.—The market retains the encouraging features noted last week. Evidence is not lacking that Standard Irons, having reached bottom figures, are again advancing both in demand and price. More Iron was probably sold by local dealers last week than for any other seven days since December. Consumption and production are once more becoming equalized, and the outlook is regarded on every side as hopeful. Mill Irons are 25¢ @ 50¢ more per ton than in January, and sellers seem quite determined to make no further unnecessary concessions.

Scrap Iron.—Old American Rails may now be quoted at \$21 @ \$21.50, with a few small sales reported at the latter figure. Stocks are accumulating.

Nails.—The market is quite firm, with indications of better prices within 30 days. Steel Wire Nails at \$2.40 are in fair demand.

Cincinnati.

Office of *The Iron Age*, Fourth and Main Sts., CINCINNATI, February 25, 1889.

Pig Iron.—There has been very little change in the local market for Pig Iron during the week. There have been but few, if any, developments which have influenced the markets, either for better or for worse. Prices have remained steady, as a rule, but there have been instances where very low rates have been made for a few hundred ton lots, which has contrasted strongly with the confidence indulged in for some makes of Iron. However, the general impression has been that the market has given evidence of improvement, although the volume of business has been only moderate and there is an absence of large trades. The transactions which have been made have been of small amounts and well distributed, the demand showing but little preference for either Forge or Foundry grades. The large sales of Car-Wheel Iron last week have not been repeated during the week under review. Among the larger sales have been 1000 tons No. 1 Southern Foundry at \$15, and 500 tons Virginia Iron equivalent to \$16.75 here. The following are the approximate prices current here at the close for cash, f.o.b.:

Foundry.

Southern Coke, No. 1 (new classification)	\$15.00 @ \$15.50
Southern Coke, No. 2 (new classification)	14.50 @ 14.75
Southern Coke, No. 3 (new classification)	14.00 @ 14.25
Ohio Soft Stone Coal, No. 1	15.00 @ 16.00
Ohio Soft Stone Coal, No. 2	14.50 @ 15.00
Mahoning and Shenango Valley	16.50 @ 17.00
Hanging Rock Charcoal, No. 1	21.00 @ 22.00
Hanging Rock Charcoal, No. 2	19.00 @ 22.00
Tennessee and Alabama Charcoal, No. 1	18.00 @ 18.50
Tennessee and Alabama Charcoal, No. 2	17.00 @ 18.00

Forge.

Strong Neutral Coke	13.00 @ 13.50
Mottled Neutral Coke	12.50 @ 12.75
Gray Forge	13.00 @ 13.25

Car-Wheel and Malleable Irons.

Southern Car-Wheel	20.00 @ 25.00
Hanging Rock, Cold Blast	22.00 @ 25.00
Lake Superior Car-Wheel and Malleable	21.00 @ 22.00

Manufactured Iron.—The market for both Plate and Bar Iron has been quiet, but the market has remained steady.

Nails.—There has been a moderate demand, which has been readily met at previous prices: 12d @ 40d sell at \$1.90 @ \$1.95 per keg, with 10¢ rebate in carload lots at the mills. Steel Nails sell at \$1.90 @ \$1.95, and Steel Wire Nails at \$2.60 @ \$2.65 per keg.

Old Material.—The market has been without animation. Old Rails have been offered to a moderate extent at \$22, but

difficult to sell over \$21.50, cash. Old Wheels have met little demand, and ruled easy at \$18 @ \$18.50 per ton, at present delivery.

Chattanooga.

Office of *The Iron Age*, Carter and 9th Sts., CHATTANOOGA, February 25, 1889.

Pig Iron.—It appears to be the general opinion among the producers that the worst is over. It is certainly a fact that producers are feeling much better than they were some two or three weeks ago, and are declining offers that are being made now, but which they would have entertained then, and are asking an average of 50¢ to 75¢ more per ton. On Friday last one of our Birmingham stacks sold 1100 tons No. 2 Foundry for \$12.80, cash on cars, and a sale of 500 tons of No. 1 by another furnace, to go to New York, was made at \$13.80, net cash in 30 days. The same furnace was solicited to duplicate the transaction, but declined to do so. A careful inquiry among a number of furnace owners developed about the same condition of feeling. Upon the subject of storage and warrant enterprise there is still a difference of opinion among producers as to its effects upon prices. The fact is that most of them are looking upon it with a feeling of indifference, and there is not the interest being taken in it that its promoters anticipated. The writer has yet to meet any producer who intends putting up a ton of their production and availing themselves of the warrants to raise money; still, if the project should materialize successfully there will probably be occasionally round lots placed and warrants issued for the purpose of raising money, but the project is creating no particular enthusiasm.

There is another feeling among the Southern producers which so far has had but little mention, and that is they are averse to prices advancing more than \$1 to \$2 per ton. The points that they make in their arguments are not worth while to mention, but, nevertheless, they exist, and from their standpoint are apparently well taken. There are very few producers in the South but what are enthusiastic as to the future of the Southern Pig Iron business, and as one of the best evidences of their convictions three of the largest and most successful concerns are now making arrangements to add two stacks to each of their plants, while the Eureka, at Oxmoor, has already commenced the erection of two more stacks to their present plant of two furnaces. Under the present conditions of the Pig Iron business, of the prospects of overproduction and present low prices it may seem premature to state that during the next five to seven years there will be not less than 25 additional furnaces erected in the Southern Iron-producing districts, and they will be of the very largest capacity and better equipped, if it be possible, than any yet built. During the past year the improvement of the better class of furnaces has been very great in economy of working as well as quality and quantity of their output, which has been very encouraging to their owners.

St. Louis.

OFFICE OF *The Iron Age*, 212 N. Sixth St., ST. LOUIS, February 23, 1889.

Pig Iron.—The market continues in an unsettled condition, and there are no transactions of any interest to report. More inquiry is reported, especially from manufacturing consumers, and indications point to an improving market with the advent of the spring months. Consumption is not large, but orders are coming in regularly, but in a small way, yet in the aggregate sufficient to prevent any large accumulation of stocks. Prices show no

change from last week, and the figures quoted below are generally adhered to, except in isolated cases. Furnaces seem disposed to maintain prices, and shrewd buyers are picking up odd lots whenever the opportunity presents itself. We quote as follows, for cash, f.o.b. St. Louis:

Southern Coke, No. 1 Foundry	\$15.25 @ \$15.75
Southern Coke, No. 2 Foundry	15.00 @ 15.25
Southern Coke, No. 3 Foundry	14.25 @ 14.75
Gray Forge	13.50 @ 13.75
Ohio Softeners	17.50 @ 20.00
Lake Superior Charcoal	21.00 @ 21.50

Missouri.

Charcoal Foundry, No. 1	16.00 @ 16.50
Charcoal Foundry, No. 2	15.00 @ 15.50

Tennessee.

Charcoal Foundry, No. 1	17.50 @ 18.50
Charcoal Foundry, No. 2	16.75 @ 17.50

Connelsville Coke, f.o.b. East St. Louis, \$4.70; St. Louis, \$4.85.

Bar Iron.—A small amount of business is being transacted at current rates. Sales are small and prices are steady, although in some cases sales are made that are considered to be pretty close to cost. Lots from store are quoted at 1.85¢ @ 1.90¢, according to quantity and quality.

Barb Wire.—The active demand which has characterized this department for some time past continues to be the feature, and it now looks as if there will be no cessation of work, as inquiries are coming in for some good-sized lots for delivery in the early spring. The open winter has enabled farmers to do considerable fence building, and the stock of wire in the hands of retailers has been pretty well cleaned up. Prices, however, fail to show any improvement, although it is doubtful if any concessions would be made on the figures quoted herewith, even on the most desirable orders. Carload lots Two and Four Point Painted, \$2.90; carload lots Two and Four Point Galvanized, \$3.50, f.o.b. St. Louis; less than carload lots, 5¢ additional.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth Ave., PITTSBURGH, February 26, 1889.

There has been nothing particularly new developed in the general Iron situation during the past week, with the exception of an increased movement in the raw article, which it is believed will lead to an improved demand for the products.

The failure of the Grand Lake Coal Company, reference to which was made in our last report, demonstrates that Southern coal is to a considerable extent supplanting Pittsburgh coal in some of the leading Southern markets. The failure of the company in question was in part caused by the losing of large Southern contracts, one of which was with the Morgan Steamship Line, at New Orleans. It has demonstrated that for general use, with the exception of gas, coal of Georgia and Alabama is about equal to that of Western Pennsylvania, and the cost of transportation is so much less that the Southern coal has the advantage in Southern markets. The river coal operators here are very much interested in having the National Government buy out the Monongahela Navigation Company and make the Monongahela River free of tolls. Our coal operators say they cannot compete with Southern coal in the South unless relieved of these oppressive tolls, and it is a matter in which the Southern people are very much interested.

Pig Iron.—There has been a considerably increased movement in Mill Irons the past week. Sales of several thousand tons have been made, some of them for future delivery, and the market, as might be expected, has stiffened up considerably. Nearly all the Iron in question reported was upon a basis of \$14.25, cash, for Gray Forge, but some furnaces are now refusing to make additional contracts at that price.

Bessemer Iron is also firmer, with some considerable inquiry. There has been an offer on the market for some days for a lot of 4000 tons at \$16.50, cash, without finding a seller, whereas a few weeks ago there was a large contract made at \$15.25, cash. Mahoning and Shenango furnaces are refusing to sell now in this market, and nearly all the business here for some months past has been done by city furnaces, who, some people think, are making an effort to shut outside furnaces out of this market, and, whether intentional or not, with considerable success this winter. Foundry Irons continue dull. We quote prices as follows:

Neutral Gray Forge.....	\$14.25 @ \$14.50, cash.
All Ore Mill.....	15.00 @ 15.50, "
White and Mottled.....	13.50 @ 14.00, "
No. 1 Foundry.....	16.0 @ 16.50, "
No. 2 Foundry.....	15.50 @ 16.00, "
No. 1 Charcoal Foundry.....	22.50 @ 23.00, "
Cold Blast Charcoal.....	25.00 @ 28.00, "
Bessemer Iron.....	16.50 @ 16.75, "

Muck Bar.—There has been little or nothing done the past week, and while there is not much offering the demand is light, and prices remain about as last quoted, \$27, cash. It is expected that there will be an improved demand before long, and, if so, a stronger market will doubtless be the result.

Spiegel.—Demand continues light, while prices remain unchanged. Small sales at \$28 @ \$29 for 20% Ferro-manganese; 80%, \$56 @ \$57, cash.

Manufactured Iron.—The market is still far from being what may be termed active, but there is more inquiry, and the indications are that business will improve from now on. Large buyers who have been holding off in order to buy at the lowest notch are now beginning to feel around, having about arrived at the conclusion that the time for placing their orders is near at hand. Prices remain unchanged. Bars at 1.70¢ @ 1.80¢; Plates, 2.1¢ @ 2.20¢; No. 24 Sheet, 2.70¢ @ 2.80¢, all 60 days, 2% off for cash. Skelp Iron continues very low. Sales of Grooved are reported as low as 1.65¢, and Sheared at 1.90¢.

Wrought-Iron Pipe.—There is a continued fair business for the season, but prices continue unsettled, and, to makers, unsatisfactory. It is said that some of the Eastern mills have sold recently below prices quoted, and if so it is evident that they are hard up for business. Discounts may be fairly quoted as follows: On Black Butt-Welded Pipe, 57½ and 5%; on Galvanized do., 55%; on Black Lap-Welded, 67½ and 5%; on Galvanized do., 57½%; 2-inch Tubing, 11¢ per foot net; 4-inch Casing, 35¢ per foot net; Boiler Tubes, 65% off regular list.

Old Rails.—There have been no sales reported since our last; there is more inquiry, and sellers are inclined to the belief that as soon as the demand fairly set in there will be a considerably stronger market. The work of lifting has been suspended for several weeks past owing to the hard freezing weather; the visible supply is growing less; stocks in hands of consumers generally are much reduced.

Steel Rails.—Heavy Sections are still quoted at \$28 @ \$28.50, cash, at mill, but there is not much doubt that a desirable order could be placed for considerably less; the prices quoted are no doubt intended for small lots.

Blooms, Billets, &c.—Bessemer Steel Blooms and Billets are still quoted nominally at \$27.50 @ \$28, and Slabs at \$27 @ \$27.50; Domestic Bloom Ends, \$17.50 @ \$18, and Crop Ends, \$18 @ \$18.50.

Railway Track Supplies.—There has been no change in prices for a considerable time. Spikes, 2.10¢, 30 days, f.o.b. at works; Splice Bars, 1.70¢ @ 1.80¢; Track Bolts, 2.75¢ with Square and 2.85¢ with Hexagon Nuts.

Old Material.—Demand continues light and prices are offish. No. 1 Wrought Scrap, \$20 @ \$20.50; Wrought Turnings, \$13 @ \$13.50; Car Axles, \$24.50 @ \$25; Cast Scrap, \$14.50 @ \$15, gross; Cast Borings, \$11 @ \$12; Old Car-Wheels, \$19; Old Steel Rails, \$17.50 for short and \$20 for long lengths.

Detroit.

WILLIAM F. JARVIS & Co., successors to Chas. Hinrod & Co., under date of Feb. 25, 1889, report as follows: While the situation remains practically the same as a week ago, there was one sale of 5000 tons of Southern Gray Forge and No. 3 Foundry made in this market during the week at the lowest price that has been made here for several years. The deliveries are to run through 10 months, beginning April. The majority of Southern furnaces refuse to name any such prices, but a few are evidently compelled to realize on their output, and this buyer, being a very desirable customer, was able to obtain the Iron at a very low price. Numerous inquiries for Lake Superior Charcoal are being made, and some buyers claim that a few furnaces are willing to shade quotations, but the best brands are held firm, and makers prefer to lose the orders rather than reduce prices. We quote for the present as follows:

Lake Superior Charcoal, all numbers.....	\$19.50 @ \$20.00
Lake Superior Coke, all ore.....	18.75 @ 19.25
Lake Superior Coke, cinder mixed.....	17.75 @ 18.25
Standard Ohio Black Band.....	18.75 @ 19.25
Southern No. 1.....	17.00 @ 17.50
Southern Gray Forge.....	15.00 @ 15.50
Southern Silver.....	16.50 @ 17.00
Jackson County (Ohio) Silver.....	18.25 @ 18.75
Old Wheels.....	18.50 @ 19.00

New York.

Office of *The Iron Age*, 66 and 68 Duane street.
NEW YORK, February 27, 1889.

American Pig.—A fair amount of business is being transacted, and sellers generally insist that the tone of the market is better. It is a fact, however, that very low offerings continue to be made, notably of No. 2 Foundry. These are not to be confounded with Irons too low in silicon for Foundry purposes, which have been seeking a buyer for some time past. In fact, a lot of 1500 tons of such Iron is now in the market at a low figure. The Thomas Iron Company report having sold 12,000 tons of Gray Forge at \$14.75 at furnace. We continue to quote for standard brands Northern Iron No. 1, \$17.50 @ \$18; No. 2, \$16.25 @ \$17, and Gray Forge, \$15 @ \$16, all at tidewater.

Scotch Pig.—We quote: Coltness, \$20.50 @ \$21; Shotts, \$20 @ \$20.50; Langloan, \$20 @ \$20.25; Summerlee, \$20.25 @ \$20.50 and Dalmellington, \$19.25 @ \$19.50.

Plates.—We quote Iron Tank, 2¢ @ 2.2¢; Shell, 2.25¢ @ 2.4¢; Steel Tank and Ship Plate, 2.1¢ @ 2.25¢; Shell, 2.35¢ @ 2.5¢; Flange, 2.6¢ @ 2.75¢, and Fire-box, 3½¢ @ 4¢.

Structural Iron.—We quote Sheared Plates, 1.9¢ @ 2¢; Universal Mill Plates, 2¢ @ 2.1¢; Angles, 2¢ @ 2.10¢; Tees, 2.4¢ @ 2.6¢, and Channels and Beams, 2.8¢ on dock for all sizes.

Bar Iron.—We quote: Carload lots on dock, half extras, Common, 1.65¢ @ 1.7¢; Medium, 1.7¢ @ 1.75¢, and Re-fixed, 1.75¢ @ 2¢.

Steel Rails.—We note sales during the week aggregating between 18,000 and 20,000 tons by Eastern mills, chiefly to Eastern roads, about one-half of the quantity being taken by a coal road. Reports of low figures keep cropping up, but on the whole the active Eastern mills are firmer,

and are asking \$27 and upward. On the 1st of April the allotment is to be readjusted, the works which have sold no Rails or only a part of their quota yielding it.

Merchant Steel.—The demoralization in Merchant Steel continues. Spring Steel has sold in small quantities to consumer at 2.20¢, delivered, cut to length, four months flat, and 2¢ has been shaded for delivery in large quantities. Planished Machinery Steel has sold, delivered at Boston, at 1.90¢ for large quantities.

Spegeleisen.—We note a recent sale at private terms to a mill in the Pittsburgh district of about 1000 tons. We quote \$27.50 @ \$28 for English Spegeleisen, ex-ship.

Billets.—There is only a very light demand for Foreign Billets and Slabs, a part of the purchases being made for manufacturing Barb Wire and Nails for export. Basic Billets are quoted \$31.50.

Wire Rods.—Negotiations are pending for a fair-sized order. The market is a little off, there being some pressure to sell which tells in the narrow market which there now is for Foreign Rods. The only business of any consequence done lately was the sale of between 2500 and 3000 tons for the Pacific Coast. Domestic Rods are selling at Pittsburgh for \$41.50, so that at the same price at tidewater for Foreign Rods there is not any chance for any business inland.

Old Rails.—During the past few days the market has been very quiet and dull. There had been sales previously, aggregating about 4000 tons, part Southern Rails shipped to this port, and part Rails from store here. We quote \$23 @ \$23.50.

Scrap.—We note a sale of 200 tons of American No. 1 at \$22, on cars at Jersey City.

Rail Fastenings.—We continue to quote Spikes at \$2 @ \$2.10, delivered in large lots. Angle Bars are 1.75¢ @ 1.85¢, delivered. Steel Angles are coming into the market in increased quantities.

Metal Market.

Copper.—At the time of our last week's report spot Chili Bars and Good Merchantable were quoted in the London market £80, gradually declining to £79.10/ yesterday, and futures of both from £75 to £67, which demonstrates the weak feeling on the other side as regards coming developments in connection with the syndicate. Sales in London aggregate 1000 tons for the week. It appears that a violent attack is just now being made in London by outside operators on everything connected with syndicate matters in the Copper trade, and that these parties are selling boldly the three months' futures at the present low quotation and all the year as low as £58. Here in the meantime absolutely nothing of interest occurred. The few lots obtainable from outside parties of Lake Copper, 16½¢ to 16¾¢, have to be paid for, while casting brands are obtainable at 15¾¢ to 16¢. This morning, London declined with spot Good Merchantable from £79.10/ to £78.10/, and futures from £67 to £66. Best Selected remained unaltered during the week at £79.10/. Our own market closed steady at 17¢ @ 16¾¢, for Lake on the spot. On February 24 it was cabled from Paris that the formation of the Compagnie Auxiliaire des Métaux had finally taken place, that the shares thereof had not been offered on the market, having all been taken by the founders of the company themselves, who held their first meeting on Thursday last, on which occasion it was shown that 25 per cent. of the capital subscribed for of 40,000,000 francs had been paid in. Messrs. Hentsch, Masson and Quiedeville have been appointed managers for six years to come, and

Messrs. Danfert and Secrétan auditors. The Paris correspondent of the Hamburg *Borsenballe* wrote, under date February 9: The negotiations between the Paris and English members of the Copper syndicate are still proceeding on the following basis: A French company is to be formed with a capital of 40,000,000 francs, which company at the same time is to be authorized first to issue 40,000,000 francs of bonds and furthermore 40,000,000 francs of bonds. This would constitute a capital of together 120,000,000 francs. But this is not enough, inasmuch as the Société des Métaux insists emphatically that the syndicate should authorize an additional issue of 100,000,000 francs in so-called warrant bonds. This issue is proposed to be made by the new company at a suitable moment in order to enable the same to carry the Copper monopoly to a safe issue. The total capital to be thus created would consequently finally reach the enormous amount of 220,000,000 francs, which it is true would enable the parties to pay for 110,000 tons of Copper and store them away. The idea of dividing the stock, a thing which heretofore was looked upon as so very important, would be dropped if the above financial plan were to be carried out, but this appears to be a matter pushed into the background by the fact that for a couple of weeks past the syndicate succeeded in selling some large lines of Copper. I am informed that the 40,000,000 francs of capital stock of the new company have been subscribed for, the greater portion of it, among others, by those English firms that took such a lively interest in the matter when it was first broached; it is therefore all the more to be regretted that the form of an English syndicate should not have been adhered to. I may also add that Baron Hirsch has made considerable advances to the Société des Métaux on Copper warrants, and that from all appearances the company is now financially stronger than it has been at any time previously. The company's shares are worth 547 francs to-day. The import of American Copper into Liverpool and Swansea from January 1 to February 16 has been 4576 tons Fine, against 3985 during the corresponding period of last year.

Tin.—Tin closed a week ago at £94. 7/6 for spot, winding up yesterday at £95, while futures advanced from £95 2/6 to £95. 17/6, the sales made summing up 700 tons. In our own market there has been a good deal of irregularity, but more doing, some 50 tons changing hands soon after the first advance in London at 21.30¢ in the open market for spot, and on the Metal Exchange 10 tons March at 21.10¢, and 20 tons April at 21.30¢ @ 21.35¢, followed by sales of 40 tons spot at the Metal Exchange at 21.40¢, 10 tons March at 21.35¢, and 10 tons May at 21.50¢, sales in the open market at the same time summing up 100 tons at 21½¢ @ 21½¢ on the spot. The exports of tin from the Straits Settlements to the United States last year amounted to 62,310 piculs, against 70,916 in 1887; 82,015 in 1886, 43,989 in 1885, 59,901 in 1884 and 114,284 in 1883. This morning London improved from £95 to £95. 10/ to the spot, and for futures from £95. 12/6 to £96. 5/. In our own market 10 tons March sold this morning at 21.55¢, and spot closes at 21½¢ @ 21½¢. **Tin Plates.**—While our own market has continued the reverse of active, leaving last week's quotations unaltered, Liverpool has been stiffening up in sympathy with steel plates, coal, oil, &c., and it now looks as though those parties who have been holding back orders for lower prices were not going to gain their point. We quote, large lines, per box: Siemens-Martin Steel, Charcoal Finish, \$4.75 @ \$5.50; Ternes \$4.12½ @ \$4.25; Coke Tins, \$4.22½ @ \$4.30, and Wasters \$4.12½

@ \$4.15. The quotation in Liverpool is unchanged at 13/ for Coke Tin.

Lead.—Sales in the open market have been limited to 200 tons Common Domestic, all told, at 3.70¢ @ 3.75¢, the metal being held with greater firmness; but consumers, sufficiently stocked to meet the light demand for their manufactures, not feeling disposed to subscribe to any further advance. St. Louis has been quiet at 3.55¢, and our closing price to-day on a firm market is 3.70¢. London for the week remained at £12. 10/ for Soft Spanish and £12. 15/ for English Pig.

Selter — Has remained featureless, pending a revival in the spring demand, delayed by untoward weather. The Western market remained tolerably firm, while here the quotation for ordinary brands does not vary from 5¢, Silesian being neglected at 5.75¢. In London Silesian improved from £17. 7/ to £17. 10/.

Antimony.—A steady local demand has caused continual firmness in Cookson at 13.25¢, while Hallett has improved to 12¢, both being scarce and well held.

New York Metal Exchange.

The following sales are reported:

TUESDAY, February 26.

40 tons Tin, spot.....	21.40¢
10 tons Tin, March.....	21.35¢
10 tons Tin, May.....	21.50¢

WEDNESDAY, February 27.

10 tons Tin, March.....	21.55¢
30 tons Tin, April.....	21.55¢
10 tons Tin, April.....	21.40¢
10 tons Tin, March.....	21.40¢

Coal Market.

The Anthracite Coal trade is stagnant, making necessary a further restriction of production. For the week ending February 23 the total shipments from the mines comprised 505,197 tons, a reduction of 60,000 tons compared with the previous week and 157,000 compared with the corresponding week last year. Since January 1 the aggregate is 4,302,319 tons, against 4,573,682 tons for the same time in 1888. The situation causes much perplexity among the Coal operators, and will be the subject of an early conference with reference to prices and production. An official of one of the large corporations argues that the presidents or general managers of the Coal-producing interests should personally direct in these matters. He says "that some of the sales agents do not seem to consider whether or not the prices at which they offer to sell Coal will enable the managers to pay the interest on the debts of their companies or afford the stockholders any dividends; and, besides, they not being directly responsible to the owners of the Coal properties and railroads, take advantage of their position to cut and slash prices whenever it suits their own fancy, in order to effect sales, irrespective of the question of profits." A letter from Shamokin, Pa., of February 24, speaks of great suffering among the miners. The writer says: "Some idea of the general situation throughout the Schuylkill region may be obtained when it is known that of the 56 collieries operated by the Philadelphia and Reading Coal and Iron Company less than 20 are in operation, and but a few of these are working full time. This means that at least 20,000 of the workers in and about the mines of the Philadelphia and Reading Coal and Iron Company are now and have been for nearly ten weeks in enforced idleness, and as their condition is generally about the same as the condition of the miners and mine-workers here and at Mount Carmel the actual distress throughout the Schuylkill region may be approximated. It is estimated that in all there are not less than 30,000 to 40,000

miners and mine-workers in all the lower or Schuylkill region without work and without money."

At Philadelphia four of the Reading steam colliers are laid up and their crews discharged, trade being virtually at a stand-still, a well-known shipping man remarking that there is now more Coal at Port Richmond than before for 30 years. In the old Lehigh region the Coal and Navigation Company have closed all their collieries. New York sales agents still quote the regular schedule prices. Freight rates are all down, lower than a year ago.

The Government purchased 2000 tons of Coal from C. G. Barber & Co. of this city, at \$3.62½ per ton, for Samoa.

The internal dissensions in the Clearfield Consolidated Coal Company were on Saturday last carried into Court of Common Pleas at Philadelphia, but on Tuesday resulted in the appointment of the Guarantee Trust and Safe Deposit Company as receiver for the company.

The Bituminous Seaboard Association is said to have agreed upon the percentages of production for tidewater shipment. Several contracts have been closed in Boston.

Financial.

Now that a new Administration is about to be inaugurated at Washington, an interesting question arises respecting the future disposition of the Treasury surplus, but it is assumed that bond purchases will continue as in the past. The volume of trade through the country at large is increased, but there is reason to suspect that the improvement is mainly confined to speculative circles. Even with this abatement the indications are generally good and warrant a more confident tone. The movement of merchandise is larger, both by rail and by the ocean carriers. Exports of provisions are particularly heavy. The clearances from all Atlantic ports of provisions last week comprised 11,831,615 lb lard, which is larger by 8,000,000 lb than in the corresponding week of last year, and 6,573,917 lb of bacon, which is greater than last year by 1,500,000 lb. The tramp steamer Kong Alf reports having run the Haytian blockade at Gonarves, disposing of flour and potatoes at \$17 ½ barrel; do. pork, \$80 ½ barrel. In flour there is more export buying and there are fair orders for wheat for the United Kingdom, which is an agreeable change. Cotton is in more demand by British spinners. Coffee is supposed to be in a stronger position and sugar has a hardening tendency. Dry goods jobbers speak of the spring trade as opening auspiciously, with favorable reports from other centers.

The stock market was affected by contradictory reports from Chicago regarding the probable outcome of the efforts to form an interstate railway association, and it was not until Thursday evening that the news came that the presidents had decided to organize without the aid of the dissenting roads. Friday being a holiday, the news, although favorably received, did not have its full effect on Saturday. The Northern Pacific and the Union Pacific agreed to make an arrangement by which the lines in Oregon and in Washington Territory are to be operated by trustees. It is reasoned that with 18 roads active members, with another road in sympathy with it, and three remaining roads more neutral than imatical, the new association has promise of stability. Moreover, the trunk lines are believed to be well organized. Chairman Cooley is said to have recently expressed the opinion that the time for cautioning, counseling and advising railway men not to break the law had passed, and that prompt measures to exact the penalties provided by the national statute were all that was left to the

men who were authorized and directed by Congress to see that the law was observed and that offenders were punished. The coal shares were depressed by a resolution of the mining companies to suspend operations two days each week, some of them closing their collieries indefinitely.

United States bonds are quoted as follows:

U. S. 4½%, 1891, registered.....	107%
U. S. 4½%, 1891, coupon.....	109
U. S. 4%, 1897, registered.....	128%
U. S. 4%, 1897, coupon.....	128%
U. S. currency 6s.....	120

The weekly bank statement from the clearing house in this city shows an increase in deposits of \$211,000, an expansion in loans of \$951,300, and a decrease in specie and legal tenders combined of \$1,502,700. The banks now hold \$15,740,-150 above the 25 per cent. required by law, against \$15,200,425 in 1888, and \$11,393,-000 in 1887. The currency movement was light. The low rates for money on call, and the heavy disbursements each month for interests and dividends create a demand for all good securities. On March 1 the Treasury will pay out interest then due on about \$170,000,000 4½ per cents, and the disbursements by railroads and other corporations at this center will reach a large total. In Boston alone they are estimated at nearly \$6,000,000. Quotations are 3% for 60 to 90 days, 3½ for four months and 4% for longer dates. The demand for commercial paper is in excess of the supply. Railroad earnings show an improvement since rates have been maintained west of Chicago. An event in the financial world was the death of millionaire Flood, of California. Stocks which Flood in bonanza days sold for \$900 per share are now freely offered at \$5 and \$8. The two mines that paid \$46,000,000 in dividends are now consolidated. Wm. G. Bates was appointed receiver for the L. M. Bates Company. The old charges of discrimination against the trade of New York by through bills of lading from Western points to European seaports are again being heard. By this means grain can be delivered in Liverpool 2¢ or 3¢ cheaper than it could be if bought in New York and forwarded from here. The Treasury at Washington received on Saturday from the Philadelphia mint 2,000,000 standard silver dollars, the weight of which is 59 tons. The number of silver dollars now in the vault is 86,-000,000, which is equivalent to 2387 tons.

Sterling exchange was firm at £4.89½ for short, slightly below the gold exporting point. In London discount rates are softening, owing to impending gold arrivals from South America and largely increased arrivals from Australia. The total clearings of 42 cities for the week ended February 23 show an increase of 19.9% compared with last year, and 28.5% the previous week. Outside of New York the gain was 9.7%. New York increased 25.2; Boston, 17; Philadelphia, 13.3; Chicago, 5.7; Pittsburgh, 8.3; Cincinnati, 9.6; Kansas City, 28.2; Milwaukee, 22.3; Omaha, 4.1; Denver, 26.8; Galveston and Duluth, 100%. St. Louis, San Francisco, Baltimore, New Orleans, St. Paul and Minneapolis all show a slight decrease. The Director of the Mint submitted to Congress his report on the production of gold and silver in the United States during the calendar year 1888. The gold product was 1,644,927 fine ounces of the value of \$33,175,000. This is about the same as in 1887. The silver product was 45,783,632 fine ounces, of the commercial value of about \$43,000,000, and the coining value of \$59,195,000. This is an increase of 4,515,327 fine ounces over the product in 1887. At the highest price of silver during the year the bullion value of the silver dollar was 75.5¢, and at the lowest price, 70.5¢. The director estimates the consumption of gold and silver in the

industries in the United States during the calendar year 1888 to have been: Gold, \$14,600,000; silver, \$3,280,000.

The imports of merchandise at this port during the week were valued at \$8,951,000, of which \$3,365,000 represents dry goods. Since January 1 the total is \$79,114,000, against \$75,902,000 for the same time last year and \$71,000,000 in 1887. The imports of specie were \$167,000 and the exports \$1,357,408. Since January 1 the exports of specie amount to \$5,242,000, as compared with \$4,204,000 for the same time in 1888.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, February 27, 1889.

During the early portion of the week large quantities of Chili Bars and Good Merchant Copper were purchased for syndicate account at £78. 10/. Afterward the syndicate agents raised their bids 17/6, carrying the price up to £79. 7/6. This brought out considerable demand from the "bears" for prompts for covering of short sales, the syndicate brokers then withdrawing. Outside holders have benefited largely by the advance, and are at present holding what few warrants they have left. Purchases for consumption have been small and are still restricted by the uncertain tone of the market. The opinion is entertained that the syndicate does not intend any movement in the direction of cornering the market, but will keep prices on a fair level. Three months' futures are still at a considerable discount and quoted to-day at £68.

After dropping to £93. 10/ the Block-Tin market has reacted sharply, the reported heavy shipments and the small buying for consumption having been offset by substantial support from large operators. Higher prices cabled from the States also assisted in the reaction, and the market still shows an advancing tendency.

Business in Tin Plate has been confined mainly to the purchase of a few special descriptions, mainly Steels, at 13/6. The general situation of the market is practically the same as a week ago. It is stated that the Wallesey Works will be erected at Liverpool.

The demand for Pig Iron of all descriptions has improved still further, and prices are again higher, with the tendency still upward. Scotch Warrants have advanced to 43/, and Makers' Brands are 1/ @ 2/ higher to-day than during the middle of last week. Hematites have also moved up 6d @ 1/ during the week, and Middlesboro' Pig is a good 1/ higher.

Old Material of all descriptions continues in slow demand, and it is believed that lower rates than those generally quoted have been accepted.

There have been no important changes in the market for Steel, as far at least as prices are concerned, and business continues quite brisk. The trade in Manufactured Iron is fairly active and at previous prices.

Cleveland Pig.—Dealing have been on a large scale, and prices show a further advance. No. 1 Middlesboro', G.M.B., 38/6; No. 3 ditto, 36/.

Bessemer Pig.—Sales have been made at 6d rise, and a further 6d advance is asked. The demand continues brisk. West Coast brands, mixed numbers, 46/6 @ 47/, f.o.b. shipping point.

Scotch Pig.—Business continues active, and prices are strong at the advance.

No. 1 Coltness, f.o.b. Glasgow	54/
No. 1 Summerlee, "	53/
No. 1 Gartsherrie, "	51/
No. 1 Langloan, "	52/6
No. 1 Carnbroe, "	45/6
No. 1 Shotts, " at Leith	51/
No. 1 Glengarnock, " Ardrossan	49/
No. 1 Dalmington, "	45/
No. 1 Eglinton, "	43/6
Steamer freights, Glasgow to New York, 5/;	
Liverpool to New York, 10/.	

Splegeleisen.—The market remains very firm, and is fairly active. English 20% quoted 80/, f.o.b. N. W. England shipping point.

Steel Rails.—Although not as active as last week the market is lively, with prices firm. Heavy sections quoted at £4. 5/, and light sections £4. 10/ @ £4. 17/6, f.o.b. at N. W. England shipping point.

Steel Blooms.—A fair business passing, but prices somewhat irregular. We quote £3. 17/6 for 7 x 7, f.o.b. at N. W. England shipping point.

Steel Billets.—There continues to be a good trade in these at firm prices. Bessemer, 2½ x 2½ inch, £4. 5/, f.o.b. at N. W. England shipping point.

Steel Slabs.—Somewhat larger sales reported, but at irregular prices. Bessemer, £3. 17/6, f.o.b. at N. W. England shipping point.

Old Rails.—The market remains quiet, with previous prices asked. Tees quoted at £3. 5/ @ £3. 6/, and Double Heads, £3. 8/ @ £3. 10/, c.i.f., New York.

Serap Iron.—A moderate business doing at unchanged prices. Heavy Wrought quoted at £2. 2/6 @ £2. 7/6, f.o.b.

Crop Ends.—Only moderate sales making and prices unchanged. Bessemer quoted £2. 10/ @ £2. 12/6, f.o.b.

Tin Plate.—The market continues quiet. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade	15/9 @ 16/3
IC Bessemer Steel, Coke finish	13/6 @
IC Siemens "	13/9 @
IC Coke, B. V. grade	13/ @ 13/3
Charcoal Terne, Dean grade	12/6 @ 13/

Manufactured Iron.—Business still of good volume. Prices show slight changes. We quote, f.o.b. Liverpool:

	£ s. d.	£ s. d.
Staff. Ord. Marked Bars	10	8 2 6
" Common "	5	12 6 6 5 15 0
Staff. Blk Sheet, singles	7	12 6 6 5 2 6
Welsh Bars (f.o.b. Wales)	5	0 0 0 5 2 6

Copper.—The market showing better tone, but rather quiet. The quoted prices are: Chili Bars, £79. 10/ for spot, and £68 for three months' futures. Best Selected, £79 nominal.

Tin.—The demand fairly active and the market firm. Straits quoted at \$95, spot, and £95. 15/ for three months' futures.

Lead.—There has been only a moderate trade. Quoted at £12. 10/ for Soft Spanish.

Spelter.—The market stronger and more active. Quoted at £17. 10/ for ordinary Silesian.

It is reported that Merion Furnace West Conshohocken Pa., has chilled.

Chicago.

Office of *The Iron Age*, 95 and 97 Washington street, CHICAGO, February 25, 1889.

Pig Iron.—There is no material change to note in the condition of the market. The general buying by all classes of consumers in the past four weeks naturally results in a period of inactivity. Should the railroad and architectural business improve there are parties who would need to buy considerably more Iron, of various grades, Consumers being pretty well supplied, and the furnaces having booked all the orders in sight, higher prices are now advocated, and from 25¢ to 50¢ $\frac{1}{2}$ ton added to the former selling figure. In the opinion of many interested in this line of trade there is no good ground for advancing at all at this time. The price for Ore this season is likely to be the closing rate of last year, and, judging by reports from the mining regions, there certainly will be no scarcity in the supply. A small reduction was recently made in freight rates on Ohio Irons coming into this market, which lowers quotations without altering former prices. Cash quotations are as follows, f.o.b. Chicago: Lake Superior Charcoal, Nos. 1 and 2, \$19.50; Nos. 4, 5 and 6, \$20; Lake Superior Coke, No. 1, \$16 @ \$16.50; No. 2, \$15 @ \$15.50; No. 3, \$14 @ \$14.50; Chicago Scotch, No. 1, \$17.50; American Scotch (Blackband), No. 1, \$18.50; Jackson County Silvery, No. 1, \$18; Southern Coke, No. 1 Foundry, \$16; No. 2 Foundry and No. 1 Soft, \$15.50; No. 3 Foundry, \$15; Gray Forge and No. 2 Soft, \$14.50.

Bar Iron.—Notwithstanding the fact that makers during the week refused to quote prices on lots ranging from 500 to 1000 tons covering three months delivery, there is very little strength to the local market. There are unauthenticated rumors circulated that Common Iron was offered at a much less figure than any previously named. Prices in a good quality of Common Iron range from 1.62 $\frac{1}{2}$ ¢ to 1.67 $\frac{1}{2}$ ¢ f.o.b. Chicago, in carload lots. Carload lots Refined Iron, f.o.b., are quoted at 1.90¢, and in small lots from store 2¢; Common Iron out of store 1.80¢.

Car Axles.—Quotations remain at 2.15¢, delivered. A meeting of the manufacturers will be held at Indianapolis on Wednesday of this week.

Steel Rails.—A great deal of figuring is going on, but very little actual business transpires. The largest transaction of the week was the closing of an option of 2000 tons, which had been given to a railroad company some time since when they placed a contract for what they supposed they would need. Quotations continue at \$30 for large lots and \$30.50 for small lots.

Old Rails and Wheels.—Sales of over 5000 tons were made last week at figures ranging from \$20 to \$20.50. Inquiries for lots of 500 and 1000 tons are pending. On the latter \$20.25, Chicago, has been refused and \$20.50 asked. There is considerable stock for sale, but all in the hands of strong parties. Car Wheels are dull at a nominal quotation of \$19.

Nails.—There is nothing very encouraging to note in this line. Sellers make a show of firmness on large lots, as they anticipate a better demand later in the season. There is plenty of stock in the market, however, that can be bought at very reasonable figures. Carload lots of Steel Nails are quoted at \$1.95, while small lots are quoted from store at \$2 @ \$2.05. The conditions of the Wire Nail trade are unchanged. Carload lots are quoted at \$2.35 and small lots from store at \$2.45. Manufacturers' quotations of either Steel or Wire Nails seem to have very little bearing on the local market just now, the job-

bers naming prices below the factory rates, which are \$2 for Steel and \$2.40 for Wire, f.o.b. Chicago. The extremely low prices for Wire Nails which have so long depressed this market have at last been withdrawn, but, as above noted, the jobbers' price has not advanced.

Barb Wire.—There has been some falling off in the demand for Wire recently, though jobbers are still having considerable trade in a small way. There is every indication that existing competition in the manufacture of Wire will continue to reduce prices. Jobbers are now quoting Painted Wire in small lots at 2.75¢, and Galvanized at 3.35¢. Stocks are abundant to meet all requirements, and manufacturers who are in a position to make Wire at the lowest prices are keeping their mills on full time, so that there is no possibility of stocks being depleted to such an extent that better prices may grow out of the scarcity should there be any urgent demand for spring consumption.

Pig Lead.—The market has gained some strength during the week. Dealers report sales of 200 tons at \$3.50, and numerous inquiries for March delivery, which may have a tendency to hold these figures firm for the next ten days.

Louisville.

LOUISVILLE, KY., February 23, 1889.

Pig Iron.—The market has been quiet with few sales. At this point more steadiness has been shown than in the past, and it is hoped that a slight advance can be obtained over the prices of the last month. Some buyers state that where they desire Iron they are still able to purchase at lowest prices offered in the past, and we know that in one instance this is true. It is reported, however, that considerable Iron will be stored South, which, if true, will have a tendency to relieve the market and to cause increased value. We quote, for cash, as follows:

Southern Coke, No. 1 Foundry, new classification.....	\$14.75 @ \$15.25
Southern Coke, No. 2 Foundry, new classification.....	14.25 @ 14.75
Southern Coke, No. 3 Foundry, new classification.....	13.75 @ 14.25
Gray Forge.....	13.25 @ 13.75
White and Mottled, different grades.....	12.75 @ 13.25
Silver Gray, different grades.....	13.00 @ 13.50
Southern Charcoal, No. 1 Foundry No. 1 Mill.....	16.25 @ 16.75
".....	14.75 @ 15.25
Southern Car-Wheel, standard brands.....	21.75 @ 22.75
Southern Car-Wheel, other brands.....	18.00 @ 19.50
Hanging Rock Coke, No. 1 Foundry.....	15.50 @ 16.00
Hanging Rock Charcoal, No. 1 Foundry.....	19.50 @ 21.00
Hanging Rock, Cold Blast.....	20.75 @ 23.75

Foreign Markets.

EQUIVALENTS.

Franc, Peseta or Lira.....	19.3
Florin (Netherlands).....	40.2
Florin (Austria).....	35.9
Milreis (Portugal).....	\$1.08
Milreis (Brazil).....	54.6
Mark (Germany).....	23.8
Kilogram.....	2.205
Picul.....	134.

EAST INDIES.

SINGAPORE. January 14, 1889.—**Tin.**—A fair business has been done in our leading articles of produce during the past fortnight. Tin has come in freely, and has been very steady in price at about \$37 $\frac{1}{2}$ picul. We must expect large supplies up to the end of the month, when the Chinese New Year holidays will check production. *Gum Copal* is in moderate supply and good demand at from \$11 $\frac{1}{2}$ picul for good, with other qualities in proportion. *Gum Damar*.—Nothing doing. **Tonnage.**—Tons all round are a shade firmer than a fortnight ago. For New York via canal there is nothing offering; via Cape the American bark McLaurin has laid on at 32/6 for dead weight. For Boston the Antioch has sailed, and the Penobscot will follow shortly. **Exchange** is firm at 3/14 for six months' sight. Total Tin shipments from the Straits Settlements to the United States during the year 1888 sum up as follows: 62,310 piculs, as compared with 70,960 in 1887, 82,015 in 1886, 43,989 in 1885, 59,901

in 1884, and 114,284 in 1883. During December the steamer Preusser still took from here for New York 1008 piculs; the steamer Glenishiel, for do., from Penang, 421 piculs; on January 6 steamer Glenarney, for New York from here, 1261 piculs, and the steamer Lennox 3781.—*Gilligan, Wood & Co.*

PENANG. January 8, 1889.—**Tin.**—Receipts for the fortnight reached 13,000 piculs; Europeans taking thereof 8000 and Chinese 5000. The market opened at \$36.70, closing at \$37.10. There were exported from here in 1888 to England 141,215 piculs, against 167,784 in 1887; to the Continent 338, against 4365, and to the United States 11,106, against 15,900. *Gum Benjamin*, No. 1, has ranged between \$34 and \$69, and No. 2 between \$30 and \$50 $\frac{1}{2}$ picul. *India Rubber* is selling at \$69.50. **Exchange.**—4 months' sight bank drafts rose to 3/14.—*Schmidt, Kusterman & Co.*

MANILA. February 18, 1889.—**Hemp.**—Some purchasing has been going on during the week at \$15 15-16, as compared with \$9 same date 1888, equaling $\frac{1}{2}$ ton cost and freight, £54, as compared with £32 last year. The clearances for the United States since last cable amounted to 9000 bales against none in 1888; since January 1 to 53,000, against 19,000; loading for do., 47,000, against 18,000; cleared for England since January 1, 40,000, against 36,000; loading for do., 4000, against none; cleared for all other ports, 5000, against 7000; receipts at all ports since last cable, 10,000, against 17,000; since January 1, 88,000, against 75,000 in 1888 and 57,000 in 1887. **Freight.**—\$7.50, against \$5. **Exchange.**—6 months' sight 3/8, against 3/8½.—*Kerr & Co.*, per cable direct, to Mr. Charles Nordhaus, New York.

COLOMBO. January 17, 1889.—**Plumbago.**—A moderate business has been done at following quotations in rupees $\frac{1}{2}$ ton: Large Lumps, from 145 @ 170; Ordinary do., 125 @ 160; Chips, 80 @ 95, and Dust, 42 @ 65. Shipments since October 1 have been distributed as follows: To England, 22,500; to Hamburg, 1250; to Antwerp, 1801; to Bremen, 456; to India, 21; to Australia, 88, and to the United States, 22,209; together 48,334, as compared with 93,782 in 1888; 80,025 in 1887, and 56,955 in 1885. *Coir Yarn*, No. 1 to 4, has remained steady at 7 to 12 rupees $\frac{1}{2}$ cwt. **Exchange.**—Six months' sight, 1/5½.—*Volkart Brothers*, through their agent, Mr. T. W. Greene, 82 Wall street, New York.

RUSSIA.

ST. PETERSBURG. February 14, 1889.—**Iron.**—A group of French and Belgian capitalists are negotiating for the purchase of the coal mines and iron works situated in Poland, near Milowice and Silesie. The price is understood to be very high, hence a commission, composed of eight experts, has been sent to investigate matters on the spot and report. A week or two may therefore elapse before the bargain is clinched.—*Journal de St. Petersbourg*.

SWEDEN.

STOCKHOLM. February 13, 1889.—**Iron Ore.**—The agitation in and out of Parliament with reference to an export duty of 70 ore to 1 crown per 100 kilograms on iron ore continues (a crown of 100 ore equals 28 cents American). The bills that have been introduced for the purpose assert that it is absolutely necessary to protect Sweden against the injurious consequences which would arise from an unrestricted export of iron ore by the Swedish-Norwegian Railroad Company, adding that the latter spontaneously offered to set aside 6/ in English money of profit for the payment of the interest on its debt.—*Dagbladet*.

BELGIUM.

BRUSSELS. February 16, 1889.—**Iron.**—The year 1889 opens in a manner encouraging the hope that the even and satisfactory course of the Iron and Steel trades will go on making satisfactory progress as we proceed. The situation is gaining in strength, inasmuch as the advance in Finished Iron of 5 francs $\frac{1}{2}$ ton is generally willingly submitted to by all consumers, and it coincides with a vigorous revival in the demand both for home use and export so early in the year. Specifications, which had been rather tardy, are now coming in rapidly. Works continue fully booked, not only those turning out Beams and Bridges, but also the works manufacturing Railroad Material. Foundries might be busier for export, but they are all the more so for local use. The consequence is that Foundry Pig is advancing, and Luxembourg No. 5 cannot be had now for less than 4.95 francs $\frac{1}{2}$ 100 kg. As for the cupolas, previously referred to, that are to strengthen the Meuse forts, Belgian machinists have now also been awarded part of the machinery, so that our domestic industry feels fully satisfied about the share it is to have in these Steel productions. The General Transatlantic Steamship Company have given an order to Cockerill, of Seraing, for three first-class ocean steamers.—*Moniteur des Intérêts Matériels*.

Hardware.

During the present month a good business has been done and it draws to a close with a general activity which should be in volume generally satisfactory. Most houses, including jobbers, commission merchants and manufacturers, report the month's business as being slightly in excess of last February's, but complaint is often made in regard to the narrow margins of profit, owing to the low prices prevailing on nearly all goods which are not in combination. The past week, however, has not witnessed any reductions in price of any importance, and in some lines the market is characterized by a greater firmness. There is some complaint of sluggishness in collections, but the financial situation is regarded as good, and the outlook for a satisfactory season's trade is favorable.

Cut Nails.

There has been some irregularity in prices, due to pressure to sell on the part of one large mill. We continue to quote \$1.80 to \$1.85 for carload lots on dock, and \$1.90 to \$1.95 for small lots from store, with the market in buyers' favor.

Wire Nails.

The market continues without especial change in feature, the prices which have lately ruled still continuing. Some of the manufacturers are showing less disposition than others to accept ruling prices, but the quotation of \$2.30 on average assortments, carload lots, at mill, is still continued. The usual advances for small lots from store are made.

Barb Wire.

The agreement between the Eastern manufacturers gives regularity to prices ruling in this market, but the transactions are very limited.

Miscellaneous Prices.

At a meeting of the manufacturers of Axles the following revised discounts were adopted, terms four months, 3 per cent. discount for cash in 30 days:

Nos. 7 to 14	55 & 5 %
Nos. 15 to 18	47 1/2 %
Nos. 19 to 22	70 %

Revised prices are also announced on heavy Axles which are sold at new figures. The condition of the market in this line of goods is referred to as satisfactory and the volume of trade as being good.

The Arms-Bell Company, Youngstown, Ohio, are paying special attention to the manufacture of Cold Punched Nuts, and in particular to Chamfered and Trimmed Nuts suitable for engines and other finished work, as well as to Railroad Track Bolts, of which they make all styles and shapes. The following quotations indicate the principal goods manufactured by them and the prices at which they are offered; terms 60 days, or 2 per cent. discount for cash in ten days:

	Discount.
Carriage Bolts	75 & 10 %
Machine Bolts	80 & 80 & 5 %
Bolt Ends	80 %
Lag Screws	80 & 5 %
Plow Bolts	65 %
Tire Bolts	70 & 10 %
Square Nuts, hot or cold	5.40¢ off list.
Hot Pressed Hexagon Nuts	5.90¢ off list.
Cold Pressed Hexagon Nuts	5.50¢ off list.
Chamfered and Trimmed Nuts	5.20¢ off list.
Washers	5.50¢ off list.

Items.

The change in the last classification, by which Hardware not exceeding 5 cents per pound in value, was placed in third class, as noticed in our last issue, is regarded by the trade with satisfaction as giving a reduced rate on many heavy

goods and as being a step in the right direction, and the large jobbing houses, by whose efforts this change was effected, are entitled to congratulation for the result achieved. As some in the trade are aware, the Simmons Hardware Company, and other jobbers in the West, made a systematic effort to have Hardware placed in third class, and, while they have not succeeded in accomplishing this, the change above referred to is largely due to their efforts.

The trade will learn with regret of the death on Sunday last of W. B. Belknap, Louisville, Ky., founder of the house of W. B. Belknap & Co., of that city.

The exports of Hardware from New York during January comprised 13,028 packages, valued at \$208,615, and of Cutlery 1377 cases, valued at \$24,687. Exports of Machinery in the same month were valued at \$286,624.

Chase, Taylor & Co., Kalamazoo, Mich., issue circulars announcing that they have been granted by D. C. & H. C. Reed & Co., Kalamazoo, Mich., a license to sell their patent Spring Tooth Harrows in all territory west of the States of New York, Pennsylvania, West Virginia and Virginia, under the Reed patent No. 201,946; and also that they have been granted by G. B. Olin & Co., Canandaigua, N. Y., a license to sell them in the New England States, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia and West Virginia. They also issue a circular giving description of this Harrow and referring to its advantages.

Canton Saw Company, Canton, Ohio, issue a convenient price-list, 40 pages, describing their Solid and Inserted Tooth Circular Saws, Knight's Patent Sawmill Dogs, See-Saw and Merry-go-Round and other goods which they are offering.

Among the special notices on page 48 will be seen one in which Clement M. Biddle & Co., 815 Arch street, Philadelphia, Pa., announce that a Southern jobbing house wishes to engage a salesman acquainted with the coal-mining and furnace-supply business. We understand that for one having the requisite qualifications the opening thus presented is a favorable one.

Enterprise Mfg. Company, Philadelphia, Pa., for whom J. C. McCarty & Co., 97 Chambers street, New York, are agents, are putting on the market a convenient arrangement by which their Mrs. Potts' Sad Irons are furnished in family outfits. For this use they are put up in cases, each case containing a set of Sad Irons, a Polishing Iron and a Girl's Iron, either nickel-plated or plain polished. Their circular relating to these goods illustrates the outfit and indicates its utility.

The name of King's Great Western Powder Company, Cincinnati, Ohio, has been changed to The King Powder Company. In announcing this change of title the company refer to its fitness, as it has no need of high-sounding titles to recommend itself or its goods, and much valuable time will be saved in writing the name, while the liability of error in its use will be reduced to a minimum. The new name went into use February 25.

A fire occurred this morning in the factory of G. & H. Barnett, File manufacturers, Philadelphia, but we are glad to be able to state that it affected only one portion of the works, and will not long delay operations, as it is expected that work will be resumed in a few days.

The Le Page Company, Gloucester, Mass., for whom Tower & Lyon are agents, 95 Chambers street, New York, have prepared Wire Stands of neat design for the convenience of dealers exhibiting and selling their Improved Process Glues. They

are intended to be placed on counters or in show windows. The cases are made to contain four different assortments of Glue, and the price of each case is the regular price of the Glue.

Russell & Erwin Mfg. Company, New York, are putting on the market a new patent Window Sash Cord and Clothes Line. It is made of wire woven around a core, and is referred to as combining durability, strength and flexibility. It is claimed that it will not stretch, does not chafe and wear, and will not fuzz, while it also costs no more than common sash lines. It is put up in pieces of 100 feet, 12 pieces in a package, and can also be had in coils or on reels of any length, as may be desired. It is made in only one size, which is referred to as strong enough for the heaviest weights and obviates the necessity of keeping several lines in stock.

To replace an engine which surrendered to the inevitable last Monday, Sargent & Co., of New Haven, will inaugurate on the 4th of March a pair of 350 horsepower Harris-Corliss steam engines, with 42 x 20 inch cylinders, balance wheel weighing 25,000 pounds, 18 feet diameter, and 38-inch face. In order to meet emergencies Sargent & Co.'s steam power has been so arranged that all the four separate and complete systems or groups of the establishment can be connected, and any or all departments can be run from one or more of the engines placed in the various localities, so that now the whole works are running driven by power borrowed from the other six engines on the premises, and the usual production of goods is obtained. We understand that the two new and powerful engines will be christened Harrison and Morton.

The Heavy Hardware Jobbers' National Union met in session at Indianapolis the 20th and 21st insts., but nothing was done which has any special bearing upon the market at the present time. There is a movement on foot to form a similar association of Eastern jobbers. The object of the associations will be to combine their efforts in correcting abuses in the trade.

John Pritzlaff Hardware Company, Milwaukee, Wis., have issued their circular No. 4, February, 1889. It is devoted to seasonable goods, such as Forks, Hoes, Rakes, Scythes, Sheep Shears, Corn Planters, Freezers, Screens, Spring Hinges, Wheelbarrows, Refrigerators, &c. Tin Plate, Sheet and Galvanized Iron, Barb Wire and Tinware are also represented in the circular.

The Atlanta Saw Works, Atlanta, Ga., issue an illustrated catalogue and price list showing the line of Saws which they manufacture. It covers Circular, Mulay, Mill, Crosscut, Gang and other Saws, of which list prices are given, with information useful to sawyers and others interested in the manufacture of lumber. The company make a specialty of very thin Circular Saws, and give particular attention to repairing.

Byram & Co., Detroit, Mich., successors to the Colliau Furnace Company, issue a catalogue describing the Colliau Patent Cupola Furnace, of which a full description is given, with illustrations of the different sizes and patterns, and testimonials from leading founders who have used it.

L. C. Beardsley & Co., Cleveland, Ohio, have issued a neat catalogue describing their manufactures, including Pails, Oil Cans, Harness Oil Cans, Syrup Cans, Gasoline Stove Reservoirs, Street Lanterns, Steel Stove Shovels, the Economic Self-Basting Steam Roaster, Felloe Plates, &c.

Vaughan & Bushnell Mfg. Company, Chicago, Ill., have issued a revised price list of their special wrought goods. It

relates to such articles as Nail Grips and Claws, Grappling Hooks, Eye Bolts, Heavy Hasps, Ice Tongs, Clothes Line Hook, Hitching Rings, Leader Hooks, &c. Their well-known Post Hole Auger is also represented, and it is stated that they have made and sold over 250,000 of them since the date of patent.

E. D. Clapp Wagon Company, Auburn, N. Y., have issued a new catalogue relating to their Wagons and Bob Sleighs, in

ized iron instead of zinc. Emphasis is laid on its excellence as a hard wood and dry air Refrigerator.

Horizontal Freezer Company, Port Byron, Ill., and Philadelphia, Pa., issue circulars relating to their Horizontal Freezers for which they solicit trial offers. They advise us that their large machines are nearly all sold to customers on trial, and that dealers are permitted to sell on the same condition. The Freezer is referred

is furnished with glass doors. This is referred to as a very desirable way to keep Hand Saws, and as being much better than having them in drawers or hanging them up. In the front of the store, occupying the middle of the room, there is a light strong rack arranged in steps, Fig. 320. It is 10 feet long, 3 feet wide at the base, 4½ feet high. There are in it four steps 10 inches wide. A 3-inch strip is nailed under them as a support. On this rack Granite-Ware, samples of Coun-

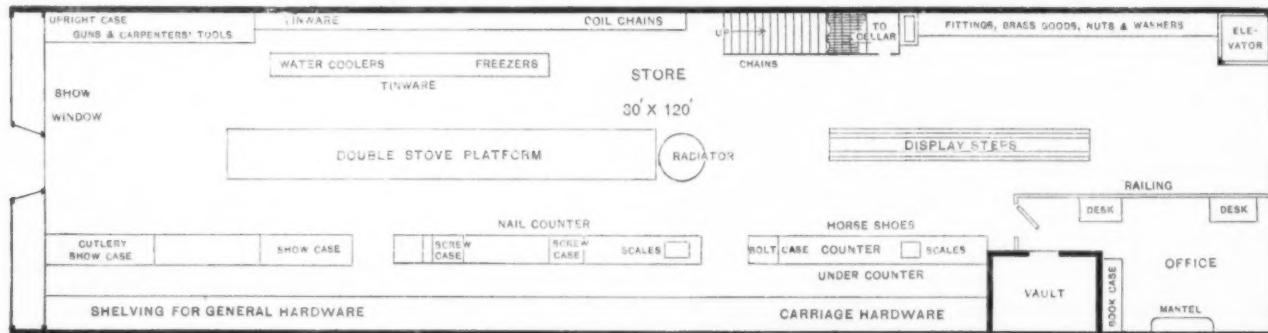


Fig. 318.—Store of C. V. B. Barse & Co., Olean, N. Y.

which leading patterns are represented, with descriptive matter. They emphasize the excellence of their Steel Axles, and in selling their Steel Axle Wagon give a guarantee that they will replace, free of charge, every broken Steel Axle, no matter what the load may be or the circumstances under which it broke.

E. C. Meacham Arms Company, St. Louis, Mo., have issued their price current No. 400, February 11, 1889. It has 16 pages devoted to Arms, Ammunition, Tents, Roller Skates, Cycles, &c.

Paine, Diehl & Co., Philadelphia, Pa., have issued a volume of 84 pages, entitled, "P. D. & Co., Keystone Cook Book," which contains a number of receipts for dishes in the preparation of

to as giving better satisfaction than ever, as it is more carefully made, and the company expect to largely increase the sale to dealers.

Arrangement of Stores.

The illustrations herewith given, Figs. 318 to 322, relate to the Hardware store of C. V. B. Barse & Co., Olean, N. Y. The store, Fig. 318, is 30x120 feet, inside measurement, the first and second floors and the cellar being devoted to the business. In the rear is a storehouse about 32x90 feet, where Nails, White Lead, Sheet Iron, Bar Iron, &c., are kept, the tin shop occupying a portion of it, as shown in Fig. 319. There is a bank entrance to the store, with a door which slides up out of the way. It will thus be seen that the

ter Scales, Lanterns, Wringers and various other goods are accommodated. We are advised that it is found very convenient and satisfactory in use. It is stained cherry, making an attractive appearance. The method in which Steel Squares are accommodated is shown in Fig. 321. In this rack there are six steps 3 inches wide, the risers being also 3 inches. The top shelf is 6 inches wide, made of ½-inch stuff, and on this a row of Bonney Vises is fastened. The Squares are kept in paper boxes, and as the price of the Square is marked on the box, the desired quality is readily selected. Each shelf holds a dozen Squares. Fig. 322 shows a sample case which permits the effective display of the goods for which it is used. The show board inside the case is covered with black velvet and

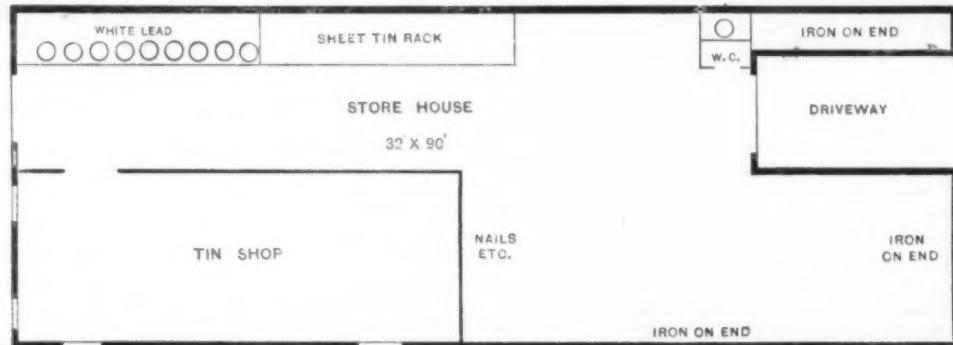


Fig. 319.—Plan of Storeroom.

which the Keystone Beaters may be used. A brief description of these Beaters, Nos. 1 and 2, is also given, while attention is likewise paid to their Self-Pouring Tea and Coffee Pots, Potato Masher, Egg Beater, Press and Strainer and other articles of their manufacture.

R. Armiger & Son, Baltimore, Md., have issued their catalogue and price list of Refrigerators for the coming season. It is divided into four sections devoted as follows: *Section 1.*—Alpine, Horizontal and Chest Refrigerators and Grocers' Chest. *Section 2.*—Buffet Refrigerators, including the Victor, Daisy, Beauty, Charm, Regal and Princess. *Section 3.*—Climax Refrigerators; and *Section 4.*—Sterling Refrigerators. The latter is referred to as an entirely new Refrigerator, added this season, made of solid oak in antique finish, and also a poplar handsomely grained in oak color. It is lined with heavy galvan-

firm has excellent quarters for the accommodation of their important business, and their store is regarded as excellently equipped and arranged. On entering the front door, Fig. 318, there is on the left an upright case which is made of walnut, and is 15 feet long, 2 feet deep, and 4½ feet high. The under part has eight paneled doors, while the upper section is furnished with eight glass doors. This case contains Mechanics' Tools, Guns, fancy Tea Pots, &c., the lower part being occupied with surplus stock. Just beyond this there is a case for Saws. This case is 3 feet 4 inches wide, 3 feet 6 inches high, and 34 inches deep. It contains four shelves, on which are strips about 5 inches wide standing on edge, with grooves sawed in about 1½ inches apart. Saws are placed lengthwise in these grooves, each kind being kept on a shelf by itself. The case

is supported in place by small black-walnut posts placed in each corner. In these a small brass rod is inserted, on which are hung a fine line of Dog Collars, the extra stock being kept in the boxes below. Believing that hanging goods in sight helps sales, this enterprising house advise us that they avail themselves of every spare place on the wall to hang something in sight, as, for example, along the stairway and on the wall up the stairs to their second story they have strips to which they hang Chains, Steelyards, Shovels, Scoops, Manure Forks, &c.

Exports.

PER BARK TEOCLE, FEBRUARY 20, 1889, FOR WELLINGTON, NEW ZEALAND.
By Arkell & Douglas.—3 dozen Wringers, 2 packages Plated Ware.
By McLean Bros. & Rigg.—6 Anvils and Vises, 3 dozen Hog Ringers, 3 dozen Hay Forks, 2 dozen Door Bells.

By H. W. Peabody & Co.—100,826 pounds Barb Wire, 2 cases Agricultural Implements, 289 dozen Handles, 2240 pounds Grease, 400 pounds Nails, 58 packages Hardware, 9 cases Stoves, 1 case Pumps, 9 dozen Whetstones, 2 packages Plated Ware, 3 cases Wringers, 2 packages Agricultural Implements, 1 case Wringers, 18 packages Hardware, 1 case Pencils, 21 packages Carriage Ware, 5 packages Lamp Ware, 120 cases Edge Tools.

By R. W. Forbes & Son.—11 dozen Garden Rakes, 1 case Hardware, 7½ dozen Rake Handles, ½ dozen Combined Drills, 29 dozen Axe Handles, 6 cases Hardware, 36 dozen Axe Handles, 5 dozen Bush Hooks, 6 dozen Garden Rakes, 1 case Hardware, 189 dozen Shoe Blacking, 4760 pounds Nails, 20 dozen

By A. S. Lascelles & Co.—30 cases Slates, *By Singer Mfg. Co.*—585 Sewing Machines, *By Russell & Erwin Mfg. Co.*—6 cases Hardware.

By Collins Co.—10 dozen Picks.

By Peters & Calhoun Co.—1 case Saddlery.

By New York Belting and Packing Co.—1 case Emery Wheels, 1780 feet Rubber Belting.

By Goulds Mfg. Co.—55 Pumps.

By Plumb, Burdick & Barnard.—6000 Carriage Bolts.

FOR AUCKLAND.

By Manhattan Brass Co.—18 packages Brass Goods.

FOR NAPIER.

By Manhattan Brass Co.—6 packages Lampware.

FOR NELSON.

By McLean Bros. & Rigg.—½ gross Blacking, ½ dozen Hay Knives, 1 dozen Leather Dashers, 2 Carpet Sweepers, 1 dozen Clocks, 200 Pot and Kettle Scrapers, 7 packages Carriage-Ware, 12 Stoves, 1200 Clothes Pins, 6 dozen Washboards, 81 dozen Handles, 3 dozen Axes.

By Arkell & Douglas.—896 pounds Axe Grease, 30 Ranges, 3 dozen Hammers, 24 dozen Handles, 4 dozen Axes, 12 dozen Picks, 12 dozen Handles, 1000 Cartridges, 2 dozen Forks, 1 gross Axe Grease, 2 Sprinklers, 6 dozen Mattocks, 3 Mangles, 5 crates Churns, 1 case Hammers, 825 pounds Nails, 1½ dozen Wringer, 7 cases Hardware, 336 pounds Nails, 5 cases Castings, 7 gross Sewing Machine Oil, 2 dozen Wrenches, 1 dozen Glue, 12 dozen Wire Goods, 3000 Hooks, 21 pounds Iron Washers, 1 case Hardware, 20,000 Cartridges, 3 dozen Blacking.

By H. W. Peabody & Co.—1 case Agricultural Implements, 44,800 pounds Barb Wire, 12 dozen Washboards, 75 dozen Brooms, 71

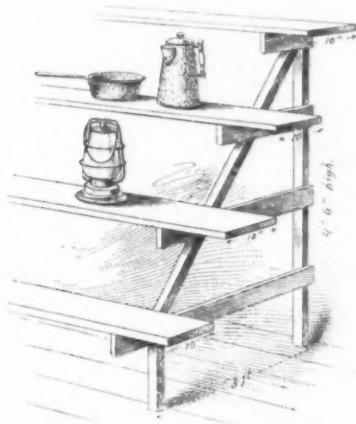


Fig. 320.—Rack for Granite-Ware, &c.

Axes, 190 dozen Axe Handles, 20 dozen Axes, 9 dozen Harness, 2½ dozen Clothes Wringers, 20 dozen Shovel Handles, 15 dozen Garden Rakes, 3½ dozen Churns, 20 boxes Carpet Tacks, 7 cases Hardware, 2 dozen Clothes Wringers, 19 cases Hardware, 22 dozen Rake Handles, 50 gross Clothes Pins, 4½ dozen Churns, 120 boxes Clothes Pins, 430 dozen Axe Handles, 25 dozen Axes, 44 packages Hardware, 500 gross Clothes Pins, 5 gross Sewing Machine Oil, 1000 dozen Axe Handles, 8 dozen Churns, 74 pounds Rubber Springs, 12 dozen Spade Handles, 4 packages Lampware, 48 packages Carriage Ware, 60 dozen Axe Handles, 3½ dozen Wringers, 1 case Hardware, 135 pounds Rubber Springs, 6 dozen Spade Handles, 23 packages Hardware, 500 pounds Horse Nails, 1 crate Carriage Ware, 1 box Harness, 14 gross Blacking, 907 pounds Horse Nails, 6544 pounds Horse Nails, 3206 pounds Horse Nails, 9 cases



Fig. 321.—Steel-Square Rack.

Hardware, 4 cases Hardware, 30 dozen Axes, 49 dozen Axes, 6 dozen Axes, 10 dozen Axes, 83 dozen Axes, 5 dozen Spades, 6 dozen Scoops, 4 cases Hardware.

By W. H. Crossman & Bro.—½ dozen Padlocks, 11 Whiffle trees, 1500 pounds Nails, 6 nests Pails, 4 dozen Grindstone Fixtures, 12 packages Hardware, 25 Lawn Mowers, ¼ dozen Scales, 5 packages Lamp Goods, 16 cases Handles, 4 cases Plow Parts, 1 bundle Carriage-Ware, 8 Dashers, 100 pounds Nails, 2 Drills, 8 rolls Sandpaper, 194 pounds Stone, 1680 pounds Axe Grease, 38 dozen Axes, 20 dozen Rakes, 1 case Hardware, 4 cases Agricultural Implements, 10 dozen Hammers, 13 dozen Hatchets, 23 Churns, 1 crate Tire Binders.

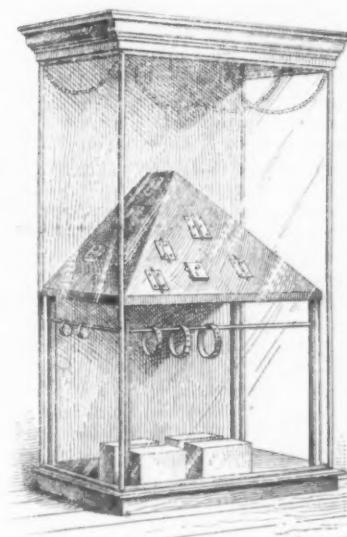


Fig. 322.—Sample Case.

packages Hardware, 12 dozen Sewing Machine Oil, 5 packages Lawn Mowers, 8 cases Firearms, 31 cases Slates.

Business Methods.

With reference to the question referred to by our correspondent in a recent issue as to the best method of keeping account of goods on hand, we have the following letter from a Hardwareman in Illinois:

As regards keeping an account of stock, as per your article in *The Iron Age* of February 14, I desire to say that, with the many small sales made in a retail Hardware store, it would be impracticable, and almost impossible, to keep an accounting so as to take an inventory at the end of the year from the books. Most retailers put the cash from cash sales in the drawer without any account, and at night charge the cash account with the aggregate amount made up of many sales, large and small. Thus we have but one entry on the cash book to keep track of the cash, where it would take a great many entries to keep track of the many small merchandise sales. We think where an accounting is kept of all merchandise going out it would be more trouble to find amount of stock on hand from the books than it would be to take an account of stock. For instance, a customer comes in and buys a package of Tacks, a Fork Handle, 10 cents worth of Copper Rivets, a 10-cent File and a box of Hog Rings; next man wants 5 cents

worth of Sandpaper, a pair of Butts, a Thumb Latch and a Bull Ring. And so it goes all day. It would take as many accountants to keep track of all these small articles as it would clerks to sell them. Where goods are kept in nice, clean shape it is no trouble to take an inventory at the end of the year.

It seems to us to be entirely unnecessary, and altogether too expensive for the retailer who pretends to have any trade, to keep an accounting of stock for the purpose of making out his want list. Our system of keeping up our stock is—first, to keep everything in its place and have a place for everything; then for each clerk, the boss included, to keep a small memorandum book in his pocket, and when any article is sold out, or getting low, to make a note of such. Now, when we get a card from blank's salesman saying he will call on a certain day, we make a list of such goods as we will want to buy of him, from our various memorandums, the day before the salesman is expected, go to the stock and see that we really need them, and give our order when he calls. In this way we know just what we want, no guesswork, do not order duplicates of what we have already in stock, and save time for the salesman, something they all appreciate. We have seen the boss sit down with the salesman and go through the catalogue, skipping things he ought to buy and buying others he did not need, taking up his own time as well as the salesman's, all for not having a want list.

Trade.

Wells & Nellegar Company, Chicago, Ill., have issued a price current under date February 19. It relates to Railroad Milk Can Stock, Steel Goods, Showcases, Clevises, Galvanized Wire, Bird Cages, Baby Carriages, Guns, &c. It is prefaced by the following remarks in regard to business:

HARDWARE.—Our business in 1888 was the largest that we have ever had in 12 months, which we attribute in part to succeeding to the Keith, Benham & Dezendorf trade, also to the class of goods for which we are headquarters and the low prices and prompt shipments which we are making. We feel confident that volume of trade will be still larger this year, with firmer and higher prices, as Hardware will certainly be no lower.

NAILS.—The demand is very great for both Wire and Cut Nails, and the recent manufacturers' advance will before long necessitate higher prices in this market.

BARBED WIRE.—Is still being sold at very low rates, and buyers are paying closer attention to quality than heretofore.

The following review of the San Francisco Hardware and Metal trade for the past year is given by the San Francisco *Journal of Commerce*:

The Hardware and Metal trade was, on the whole, 25 per cent. larger than in 1887—in some cases much larger. The increasing population of the State, and our extraordinary and varying manufactures, are the direct cause of this. Our manufacturers of Agricultural Implements, Iron and Steel Wire, &c., are very important, and are daily increasing in extent and value. Our Canned Goods and Salmon industries called for an especially large supply of Tin Plate. There will be a large increase noted in the business of 1889. The volume of the business done was as follows:

Agricultural Implements.....	\$3,000,000
Iron and Steel.....	6,100,000
Hardware.....	3,000,000
Tin Plate.....	1,400,000
Quicksilver.....	1,415,000
Wire and Wire Goods.....	2,000,000
Pig Iron.....	430,000
Nails.....	1,100,000
Various.....	100,000
Total.....	\$18,445,000

Agricultural Implements. Pounds.

Imports in—	Pounds.
1884.....	15,300,890
1885.....	12,681,000
1886.....	11,999,310
1887.....	16,722,320
1888.....	20,790,440

Imports by rail have thus been much larger than in 1887. The business of the year may be reported as good, while the development of the California industry has exceeded expectations. Our home industries are steadily increasing in importance and in suitability to the needs of the State. The heavy rains insure an extra good demand for 1889. The steady settlement of both sections of the State should insure an even larger than ordinary demand. Then, too, our farmers are becoming more careful and more scientific in their methods of cultivation, and are constantly on the lookout for the latest and most improved Agricultural Machinery.

The Quincy Mine.

The pleasant effect upon the balance sheets of the copper mining companies of the cornering operations of the syndicate is well illustrated by the annual report of the Quincy Mining Company. The product of the mine was 7,762,945 pounds of mineral, yielding about 83.10 per cent., or 6,367,809 pounds of refined copper, for which was realized the gross sum of \$1,014,315.38, silver produced adding to the revenue \$4173.04. The running expenses of the mine were \$360,585.39, and the smelting, transportation and all other expenses, \$106,841.84. In addition to this, \$33,433.01 were spent for building and construction, \$67,117.37 for the Quincy and Torch Lake Railroad, and machinery was contracted for to the extent of \$75,000, leaving as a mining profit \$375,510.81. From interest on loans and sale of real estate additional funds were obtained, making the income \$386,256.66. Adding the balance of January 1, 1888, of \$536,509.75, there was available for dividends \$922,766.41. There was actually paid out in profits in 1888 \$360,000, leaving a balance on January 1, 1889, of \$562,766.41, out of which \$200,000 has been since declared in dividends. The company had an original paid-up capital stock of \$200,000, and have during their existence paid on this amount \$4,970,000. The greater part of the product of the mine is obtained from stamping rock, 117,514 tons being crushed, which yielded 3.04 per cent. of mineral. The company decided during the year 1888 to build a new mill, located at Torch Lake, to connect with which the construction of the Quincy and Torch Lake Railroad was begun. It is expected that this road will be in running order early the coming summer. It will be six miles long, with an almost uniform grade of 90 feet to the mile. The preparations for building the new stamp mill at Torch Lake are under way, contracts being let for two steam stamps of the latest design capable of crushing 250 tons of rock per day. A third steam stamp is to be added later. The plant includes an 8,000,000 high duty pump engine, one 14 x 36 inch Corliss engine, six 6 x 16 inch return tubular boilers, and 56 iron jigs. It will be seen, therefore, that this new equipment promises to increase the capacity of the mine by about 50 per cent., so that when it is in full operation the yield annually should be close to 9,000,000 pounds fine. In 1887 the earnings of the company on a product of 5,609,762 pounds of ingot were \$187,728.29. Practically the high prices running during 1888 have doubled the profits of the mine.

In a circular to manufacturers, the Board of Trade of Tiffin, Ohio, offer as inducements for locating there free natural gas and free building sites. During the past eight months the following companies have located there: A. J. Beatty & Sons' glass works, employing 400 men; Tiffin Glass Company, 200 men; Belgian Glass Company, 100 men; Ohio Lantern Company, 75 men; American Pulp and Paper Company, 100 men; Western Crayon Works, 50 men; Glick & McCormack's wagon supply works, 40 men; Brewer Pottery Works, 600 men, and the Sterling Wrench Company, 75 men. Tiffin has first-class railroad facilities, has water works and sewer system, and incandescent and arc light stations.

Harper's Weekly publishes in its last issue an article on the Robert process, accompanied with an illustration of a Bessemer converter of preposterous dimensions. It would be altogether useless to criticize the report in question. Suffice it to say

that the writer claims the following: "The entire plant, including engines and all the necessary machinery for the production of 100 tons a day of any grade of iron or steel, can be built for less than \$10,000, or one-third the cost of the Bessemer plant of the same capacity. The tuyeres of a Bessemer converter must be renewed after 15 blasts. The tuyeres of the new last for 250 blasts. The Bessemer converter must be relined after a very few blasts, the Robert after 1000 blasts." It is fair to assume that the writer knows as much of the Robert process as he does of Bessemer steel manufacture.

The New Submarine Boat.

The bid of the Columbia Iron Works, of Baltimore, for the construction of the submarine torpedo-boat desired by Secretary Whitney is the only one that can be accepted. That of Mr. Baker, of Des Moines, does not contain the necessary guarantees, while the Baltimore company offer them, and this company are now building the gunboat Petrel for the Navy Department. The Holland boat, an improvement on which it proposes, is familiar in New York waters, having shown in North River trials, witnessed by thousands of people, its powers of diving and rising at will, and of going a certain distance under water.

The great problem is as to what this practicable distance beneath the surface is. Many boats can go all day, and perhaps all night added, with a mere curved back surmounted by a cupola showing. But what is wanted is the distance a boat can go with nothing showing. In other words, the true problem is a submarine boat that can sink miles distant from the enemy and guide herself under water to that enemy. The storm of heavy projectiles now available from Hotchkiss cannon and rapid-fire guns makes the show of even an armored conning tower perilous. The custom is, in talking of such inventions, to dwell on the enormous size of the dynamite torpedo that can be exploded beneath the hostile hull. That, however, is not the immediate question at all. The first thing is the power of travel and guidance completely under water. With that once accomplished, a torpedo as big as a balloon can be used if the inventor likes. The results of the explosion of gun cotton or dynamite need not be dwelt on; the only question is as to carrying it with certainty to the place where it is to be applied.

The Columbia Iron Works apparently propose a boat that will do this, although the exact specifications of a contract may reveal some shortcoming in the exceedingly difficult task. Submarine boats of various sorts can do many wonderful things. They can remain submerged for six or eight hours, and the crew will come out no worse for the performance. They can sink rapidly, and keep an even keel under water by an ingenious system of balanced rudders. They can drop to a depth sufficient for them to go under any keel. They can disappear under the water and emerge half a mile distant. The inquiry naturally is whether this is not enough, and why there is not an instant rush to build such boats. The reply is that what is needed is combined performances of this sort, each of which can be a little less remarkable than when used separately. A speed of twelve knots on the surface is excellent, but not so valuable as one of six knots under the water. Submerging for eight hours at rest is noticeable, but submerging for one hour is more so, provided during that hour the boat can be kept going. The difficulties of powerful enough storage batteries where electricity is employed, and the intolerable heat generated where steam is used in running under water—this last, of course, re-

quiring stored steam—are well known. A boat that will go under the water, without once showing itself, for a specified distance (which distance need only be such that it could not have been detected by an enemy when it went below the surface) will be a great success, whatever its speed or slowness as a surface boat. It is a matter of minor consequence even in what time it accomplishes this distance wholly beneath the water.

The most interesting foreign submarine boats at the present time are the new ones on which France and Spain have been recently experimenting. According to *Le Temps* the trials of the Gymnote, at Toulon, were very satisfactory. She is said to be of about 30 tons displacement, and to steer exceedingly well, maintaining any desired depth without difficulty. She is operated by electricity, and at full power has a speed of from 9 to 10 knots, this presumably being on the surface. The Spanish submarine boat Peral has also attracted much attention. She is 72 feet long by nearly 9½ feet broad, and 87 tons displacement. She is fitted with electro-motors and is said to attain a speed of 11 knots on the surface, and not much less below. She has recently been launched, but has not been tried. Commander Peral is confident she could remain submerged more than a day before the air would need to be renewed. She is to carry Whitehead torpedoes.

It is admitted that all submarine torpedo-boats yet tried have fallen short of what is desired, and the proposals made by the Columbia Iron Works are upon the whole more promising than any. A guarantee of 9 knots submerged, with a sub-surface endurance for an hour while thus running, is more than could have been hoped for by the most eager advocate of submarine boats. If she can literally fulfill this our Government will have the start of the rest of the world in this important branch of naval warfare.

We have received the annual report of the secretary and treasurer of the Brown & Sharpe Mutual Relief Association, which was organized for the mutual relief of its members in case of sickness or other infirmity unfitting them for daily labor. The membership is divided into two classes: the first consisting of those whose weekly pay is \$8 or over, and the second of those whose pay is less than \$8 per week. Any person in the employ of the Brown & Sharpe Mfg. Co. is eligible for membership. Admission to the first class is 50 cents, and to the second 25 cents. The dues in the first are 5 cents per week, and in the second 2½ cents, collected every four weeks. In January, 1888, the membership was 253, and during the year 147 entered and 93 left the association. There are 267 belonging to the first class and 40 to the second. During the year 29 assessments were made, and 668 day benefits paid, of which 562 were for sickness and 106 for other causes. The treasurer had on hand, at the beginning of the year, \$156, and received during the year \$715. The expenses amounted to \$616 for sickness and \$19 for all other expenses. The balance on hand January 1, 1889, was \$242.

During the week ending February 23 the Scranton Steel Company, at Scranton, Pa., made in 760 heats 4536 ingots, weighing in the aggregate 5025 tons 11 cwt., the best day's work being 892 tons. In the same week the mill turned out 4243 gross tons of rails.

A. E. Hunt, of Pittsburgh, is manufacturing aluminium on a large scale by a process invented by himself. A sample of the metal in a large ingot was shown at the recent meeting of the American Institute of Mining Engineers.

Wright's Patent Self-Lubricating Axle.

This axle is manufactured by the Buffalo Patent Axle and Wheel Company, Buffalo, N. Y. It is shown in the accompanying illustrations, Fig. 1 representing one end of the axle provided with a hub, Fig. 2 showing the operation of the axle with patented parts, and Fig. 3 showing the back part of the axle. In Figs. 2 and 3 the different parts are denoted by the following letters: A, axle; B, axle bear-

also of the steel parts of the axle, is of special quality, no expense having been spared in the material or finish of the goods. They also claim that the axles are especially durable, and that even with the self-lubricating feature and the other advantages possessed they are offered at about the price of the ordinary axle.

George Gunton, the author of "Wealth and Progress," delivered a striking lecture in Union Hall, Boston, a few nights ago, on "The Economic Relation of Labor to

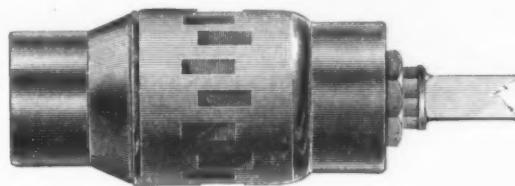


Fig. 1.—One End of a Vehicle Axle Provided With a Hub.

ing; B', fixed collar; C, flanged collar; D, movable flange; E, swivel nut; F, axle box; G, oil chamber; H, nut; I, inside hub band; J, hub; K, outside hub band; L, mortise. The nut H on the front end of the axle has four different uses—namely, it aids in setting the box, serves an oil chamber, contains absorbent for evenly supplying the oil, and at the same time has the appearance of the ordinary hub, except that it is entirely free from

Capital in Modern Times." In the course of it he pointed out the tendency of an increased diversity of manufacturing interests to bring the capitalist and laborer nearer together. "With the growth of the factory system was inaugurated a new system and a new epoch, upon the threshold of which we now stand. Adam Smith, with his doctrine that profits were the object of labor, and that high profits grow out of low wages, had been the high

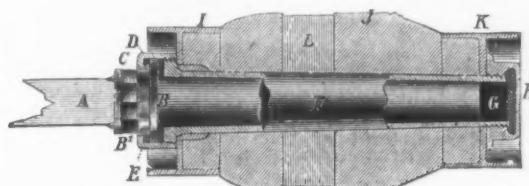


Fig. 2.—Showing Operation of Axe With Patented Parts.

oil on the outside. The manufacturers call special attention to the lubrication, and allude to it as practical and successful under the severe tests to which it has been exposed. The ease and rapidity with which the oil is applied is mentioned, and they guarantee that there will be no setting of the wheel if properly oiled four times a year. The point is also made that the axle is strongest where others are weakest, and that they are proof against breakage in ordinary use. Other points made in regard to it are: That the axle-

priest of the old epoch. Time was when a few aristocrats in one country or another consumed all which capital could produce. But, with machinery and all improvements, those few, that small and privileged class, can no longer begin to consume all which capital is eager to produce. The middle and lower classes now stand ready to be the consumers, and whatever raises their standard of living, be it fair wages or short hours, makes of them a tremendous factor in the success of the capitalist. Help the laborer up! Enable him to buy

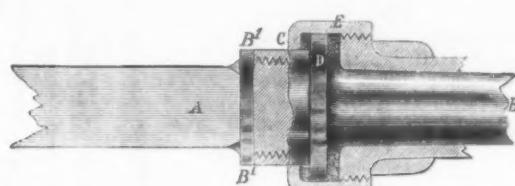


Fig. 3.—Showing Back Part of Axe.

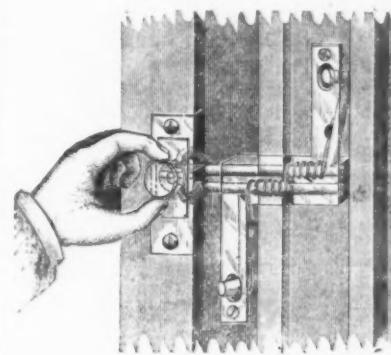
box is very simply set, and requires no banding of the hub, except those bands furnished free with the axle, nor wedging of the box; that owing to the packing of the box in the rear and the perfectly sealed front sand or grit cannot get in or oil work out, and that as the collar of the axle is provided with washers on both sides the wheel is noiseless; that the box being made of malleable iron, case hardened and smaller, affords greater depth for the spoke without increasing the diameter of the hub; that this self-lubricating axle is adapted to fine carriage work, while it is also suitable for heavy wagons, and that the malleable iron used for the boxes, as

your manufactured goods. Give him civilization, self-respect, fair wages. Do not crush him with too long hours. The result will flow into your own coffers in the end, O capitalist! Kill not the goose that lays the golden eggs. Preserve the laborer's well-being as the most valuable, the absolutely indispensable factor of your own success."

California carriers of fruit and vegetables are practically shut out from the Eastern market by increased freight charges amounting to \$20 per car. The shipments by sail last year approximated 500,000 cases.

Timby's Burglar-Proof Sash-Lock and Ventilator.

Messrs. Jenkins & Timby, of Oswego, N. Y., and 102 Chambers street, New York, are introducing to the trade what they are pleased to call Timby's Burglar-



Timby's Burglar-Proof Sash-Lock and Ventilator.—Fig. 1.—Section of Window Frame, Showing Application of Lock.

Proof Sash-Lock and Ventilator, a general idea of the construction and operation of which may be gathered from an inspection of the accompanying illustrations. Fig. 1 shows a section of the window frame with the lock applied, the cut being semi-transparent for the purpose of showing the interior construction, actuating spring, &c. Fig. 2 shows the device with



Fig. 2.—Section Showing Thumb-Nut Moved Upward, Releasing Upper Sash.

the thumb-nut moved upward in a position to release the upper sash. Fig. 3 is a back view of the lock and operating device, the thumb-nut being moved upward and the bolts thrown back, the same as in Fig. 2. The bolts employed in this device are made from the best malleable iron, the case is of wrought steel, while the face-plate and thumb-nuts are made of

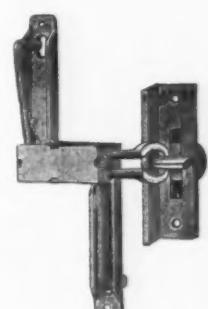


Fig. 3.—Back View of Lock and Operating Device.

brass and bronze metal highly polished and lacquered. The manufacturers state that this lock is very simple in construction and operation, and is readily adapted to any window. One lock is employed to fasten either one or both sash, as may be

desired, securing them in any position, whether the windows are entirely closed or are adjusted for purposes of ventilation. The device is said to automatically secure the sash in place, and the lock is applied in such a manner as to be burglar-proof. It is said that varying thicknesses of sash or inside strips do not interfere at all with its application. It may be used on windows having sash adjusted with or without weights, and does not obstruct the employment of weather-strips or inside blinds. The principal features of construction are covered by letters patent granted to T. F. Timby, under date of March 29, 1887. This lock is made in three sizes, the smallest being designed for ordinary windows, and especially for dumb-waiter doors. The firm are meeting with a very gratifying demand for this novelty, and inquiries are daily received from all parts of the country.

The I X L Poke.

This article is made by A. W. Bishop, Berea, Ohio. The special feature in this poke is the fact that the head, or cross-



The I X L Poke.

piece, is hinged on one side, being attached to the other by a bolt or catch operated by a spring. With this construction it can be brought up near the animal's neck and avoid the difficulties which have been found when it, as in other pokes, is placed too far down, and especially the liability of the animal to get his front feet through and be cast. As will be inferred from the illustration, the head is so constructed that, when pressed upon, the pins, covered in ordinary use, project and pierce the skin of the unruly beast. In order to preclude the possibility of their breaking, it is stated that the best of oak or hickory timber will be used. The effectiveness of this contrivance in preventing mules or horses from pushing or jumping fences, or being injured by barb wire, is alluded to.

The Wentworth Dust Guard Axle.

This axle, the construction of which is represented in the accompanying illustrations, is made by the Wentworth Spring and Axle Company, Gardiner, Me. It is intended to meet the demand for an efficient, easily applied and strong contrivance for keeping dust and grit from the axles of carriages, while it will also prevent the sticking of wheels, the waste of oil or grease used in lubricating and the

the scale of wages, the cost of building appears to be approximately the same in the two countries.

New Combination Divider No. 85.

This tool is made by L. S. Starrett, Athol, Mass. The cut represents it with its attachments. It has, it will be observed, auxiliary caliper legs which, together with a common pencil, may all be used interchangeably with the arms, forming valuable



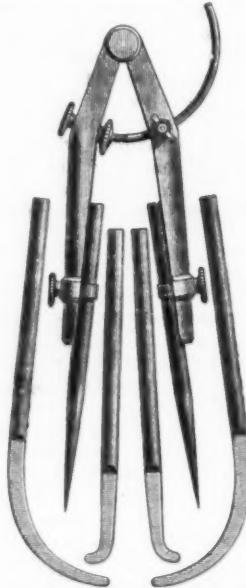
Wentworth's Dust Guard Axle.

untidy appearance of the axle stock caused by the escaping oil. As will be seen from the illustrations, the flange of the guard, which is made of malleable iron neatly finished, is made to fit a hub of any size, and is attached to the shoulder of the axle by a right and left hand thread and is turned to its place by a light wrench furnished for the purpose. The box is set as for other axles, the rear band of the hub being made to project $\frac{1}{4}$ inch over the wood. The following points are made in regard to the advantages of this axle: That it is especially strong, being of full size of iron or steel where the strength is needed; that it protects the axle arms from water, dirt or grit; that with ordinary care it will never stick; that no oil is permitted to outwork upon the axle stock and hub; that, as the oil is retained and kept clean, less frequent oiling is required; and that it is simple, strong and especially durable.

Grasse, in the South of France, is the headquarters for the manufacture of perfumes, though Nice and Cannes are close rivals. Grasse and Cannes excel in the culture of the rose, cassie, jasmine and tuberoses. Nice is celebrated for its violet and mignonette, while Sicily furnishes most of the orange and citron. In Grasse 22,000 pounds of orange blossoms were received at the factories in a single day, and the value of the flowers consumed at the three points named approximates \$1,000,000 yearly. From 120,000 to 150,000 pounds of pomade are imported each year for use in the processes of manufacture, packing, &c.

Commendation from a high source was bestowed upon American workmen by Lord Brassey, of England, in a paper read by him on the 22d inst. before the United Service Institution. In reference to the building yards of America he said: "No navy has displayed more original genius in construction than that of the United States." The lecturer then proceeded to compare English and French dockyards, stating that in French dockyards the number of workmen is 21,000, and their average earnings £40 a year. The number of workmen in English dockyards is 18,047, and their average earnings exceed £65 a year. With this remarkable difference in

combinations. A novel feature [in] this divider is an auxiliary nut between the arms to lock them firmly against the action of the spring after the fine adjustment is made, thus remedying the weak point in the common wing-divider, the legs of which are only as stiff as the adjusting spring. It will be observed also that the wing is round and is fastened by passing through a stud set in the arm, upon which is a wing-nut with full thread to clamp the wing firmly. This is referred to as more efficient and durable than the common kind with the screw tapped upon the arm only three or four threads deep, which soon wears out. The head and arms are made from malleable iron, the rest of steel. The points are hardened and warranted first



New Combination Divider No. 85.

class. The smallest size is 7 inches long, which by adjustments of points becomes 9 inches, and will describe a 22-inch circle. It will caliper 11 inches outside and 13 inches inside. The second size is 9 inches and by adjustments of points becomes 12 inches, and will describe a 30-inch circle, and caliper 14 inches outside and 16 inches inside. The divider will be sold without caliper legs when so ordered.

CURRENT HARDWARE PRICES.

FEBRUARY 27, 1889.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers' name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers, at the figures named.

Ammunition.—

Caps, Percussion, 1000—
Hicks & Goldmark's
F. L. Waterproof, 1-10's... 50¢
E. B. Trimmed Edge, 1-10's... 60¢
E. B. Grnd. Edge, Cent. Fire, 1-10's, 70¢ 75¢
Double Waterproof, 1-10's... \$1.40
Musket Waterproof, 1-10's... 50¢
G. D. ... 28¢
S. B. ... 30¢
Union Metallic Cartridge Co.
F. C. Trimmed... 50¢
F. L. Ground... 65¢
Cent. Fire Ground... 70¢ 25¢
Dbl. Waterproof, 1-10's... \$1.40
S. B. Genuine Imp., orded... .45¢
Eley's E. B. ... 54¢ @ 55¢
Eley's D. Waterproof, Central Fire... \$1.00

Cartridges.

Rim Fire Cartridges... 50¢ & 52¢
Rim Fire Military... 15¢ & 25¢
Cent. Fire, Pistol and Rifle... 25¢ & 25¢
Cent. Fire, Military and Sporting... 15¢ & 25¢

Blank Cartridges, except 22 and 32 cal., additional 10% on above discounts.
Blank Cartridges, 22 cal., \$1.75... 25¢
Blank Cartridges, 32 cal., \$3.50... 25¢
Primed Shells and Bullets... 16¢ & 25¢
B. B. Caps, Round Ball, \$1.75... 25¢
B. B. Caps, Con. Ball, Swgd., \$2.00... 25¢

Primer.

Berdan Primers, \$1.00... 25¢
B. L. Caps (for Sturtevant Shells) \$1.00... 25¢

All other Primers, \$1.20... 25¢

Shells.

First quality, 4, 8, 10 and 12 gauge... 25¢ & 25¢
First quality, 14, 16 and 20 gauge (\$10 list)... 30¢ & 10¢

Star, Club, Rival and Climax brands, 10 and 12 gauge... 35¢ & 10¢
Club, Rival and Climax brands, 14, 16 and 20 gauge... 30¢ & 10¢

Seibold's Comb. Shot Shells... 15¢ & 25¢
Brass Shot Shells, 1st quality... 60¢ & 25¢

Brass Shot Shells, Club, Rival, Climax... 65¢ & 25¢
I X L, 10 and 12 gauge... 40¢ & 25¢

"Special," 16 gauge... 30¢ & 10¢
"Special," 10 and 12 gauge... 40¢ & 10¢

Fowler's Pat... \$3.25

Sheets Loaded.

A. M. C. List No. 10, 1887... 20¢ & 10¢

Wads.

U. M. C. & W. R. A.—B. E., 11 up... \$2.00
U. M. C. & W. R. A.—B. E., 728... 2.60

U. M. C. & W. R. A.—P. E., 11 up... 3.10
U. M. C. & W. R. A.—P. E., 728... 4.90

Eley's B. E., 11 up... \$1.75
Eley's P. E., 11 @ 20... 2.80

Anvils.

Eagle Anvils, F & 10¢... 20¢ & 20¢
Peter Wright's... 9¢ & 6¢

Armitage's Mouse Hole... 8¢ & 6¢
Trenton... 9¢ @ 6¢

Wilkinson's... 9¢ @ 6¢
J. & Riley Carr, Pat. Solid... 11 @ 11¢

Moore & Barnes Mfg. Co... 33¢ & 25¢

Anvils.

Miller's Falls Co., \$18.00... 20¢
Cheney Anvil and Vise... 25¢

Allen Anvil and Vise... \$3.00, dis 40¢ & 10¢

Apple Parers.

Advance... \$0.75
Antrим Combination... 5.50

Baldwin... 5.25
Champion... 5.25

Eureka... 1888... 10¢
New Family State... 12¢

Gold Medal... 4.00
Hudson's New '88... 3.75

Ideal... 4.75
Improved Bay State... 30.00

Little Star... 5.00
Monarch... 13.50

New Lightning... 5.50
Oriole... 4.00

Penn... 4.00
Perfection... 4.00

Pomona... 4.00
Rocking Table... 6.00

Turntable... 4.50
Victor... 13.50

Waverly... 4.50
White Mountain... 4.50

72... 4.25
76... 5.75

78... 6.50

Augers and Bits—

Douglas Mfg. Co... 70¢
Wm. A. Ives & Co... 70¢

Humphreysville Mfg. Co... 70¢
French, Swift & Co. (F. H. Beecher)

Cook's, Douglas Mfg. Co... 55¢
Cook's, N. H. Copper Co. 50¢ & 10¢/doz 50¢ & 10¢

Ives' Circular Lip... 60¢
Patent Solid Head... 30¢

C. E. Jennings & Co., No. 10, extension... 40¢
C. E. Jennings & Co., No. 30... 60¢

20¢ & 25¢
Lewis' Patent Single Twist... 45¢

Imitation Jennings' Bits... 60¢ & 60¢
Pugh's Black... 20¢

Car Bits... 50¢ & 10¢/doz 60¢
L. Hommodie Car Bits... 15¢ & 10¢

Forster Pat. Aug. Bits... 10¢

Hollow Augers—

Ives'... 25¢ & 10¢
French, Swift & Co... 25¢ & 10¢
Douglas'... 25¢ & 10¢
Bonney's Adjustable, 1/2 doz... 40¢ & 10¢
Stearns'... 20¢ & 10¢

Crank, Connel's... 20¢ & 10¢
Lever, Sargent's... 60¢ & 10¢
Lever, Taylor's Bronzed or Plated Set... 20¢ & 10¢
Lever, Taylor's Japanned... 20¢ & 10¢
Pull, Brook's... 50¢ & 10¢

February 28, 1889

Cards—	
Horse & Curry.....	10&10@10&10&10%
Cotton.....	New list, Aug., 1885.
	10@10&10%
Wool.....	New list, Aug., 1885.
	10@10&10%
Carpet Stretchers—	
Cast Steel, Polished.....	per doz \$2.25
Cast Iron, Steel Points.....	per doz 80¢
Socket.....	per doz \$1.75
Bullard's.....	25@25&10%
Carpet Sweepers—	
Bissell No. 5.....	per doz \$17.00
Bissell No. 7 New Drop Pan.....	per doz \$19.00
Bissell, Grand.....	per doz \$36.00
Grand Rapids.....	per doz \$24.00
Crown Jewel, No. 1, \$18.00; No. 2, \$19.00; No. 3, \$20.00	
Magic.....	per doz \$15.00
Jewel.....	per doz \$17.00
Improved Parlor Queen, Nickel'd.....	per doz \$27.00
Improved Parlor Queen, Japanese.....	per doz \$24.00
Excelsior.....	per doz \$22.00
Garland.....	per doz \$18.00
Parlor Queen.....	per doz \$24.00
Housewife's Delight.....	per doz \$15.00
Queen.....	per doz \$16.00
Queen, with band.....	per doz \$18.00
King.....	per doz \$30.00
Weed, Improved.....	per doz \$18.00
Hub.....	per doz \$16.00
Cog-Wheel.....	per doz \$16.00
Conqueror.....	per doz \$22.00
Easy.....	per doz \$22.00
Monarch.....	per doz \$22.00
Goshen.....	per doz \$21.00
Advance.....	per doz \$18.00
Ladies' Friend, No. 1, per doz, \$15.00; No. 2, \$16.00	
American.....	per doz \$15.00
Grand Republic.....	per doz \$35.00
Cartridges—	
See Ammunition.	
Casters—	
Bed.....	per doz \$10.
Plate.....	Brass, 55@55&5%; Others, 60@60&5%
Shallow Socket.....	Others, 60@60&5%
Deep Socket.....	40@10%
Yale Casters, list May, 1884.....	30@10@40@10%
Yale, Gem.....	60@60&5%
Martin's Patent (Phoenix).....	45@45@50%
Paxton's Anti-friction.....	00@60@10%
Giant Truck Casters.....	30%
Stationary Truck Casters.....	50@10%
Socket Truck Casters.....	50%
Cattle Lenders—	
Humason, Beckley & Co.'s.....	70%
Sargent's.....	60@60@10%
Hotchkiss.....	30%
Peck, Stow & W. Co.....	50@10%
Chain—	
Trace, 6½-10-2, exact, per pair, \$1.03.....	50@10@50@10@5%
Trace, 6½-10-3, exact, per pair, \$2.02.....	50@10@50@10@5%
Trace, 7-10-2, exact, per pair, \$1.11.....	50@10@50@10@5%
NOTE.—Traces, "Regular" sizes, 3¢ net per pair less than exact.	
Log, Fifth, Stretcher, and other fancy Chains, list Nov. 1, 1884.....	50@10@50@10@5%
American Coil, in cast lots, 3-16 ¼-5 ½-7 ½-9 ½-10 ¾-11 ½-12 ¾-13 ½-14 ¾-15 ½-16 ¾-17 ½-18 ¾-19 ½-20 ¾-21 ½-22 ¾-23 ½-24 ¾-25 ½-26 ¾-27 ½-28 ¾-29 ½-30 ¾-31 ½-32 ¾-33 ½-34 ¾-35 ½-36 ¾-37 ½-38 ¾-39 ½-40 ¾-41 ½-42 ¾-43 ½-44 ¾-45 ½-46 ¾-47 ½-48 ¾-49 ½-50 ¾-51 ½-52 ¾-53 ½-54 ¾-55 ½-56 ¾-57 ½-58 ¾-59 ½-60 ¾-61 ½-62 ¾-63 ½-64 ¾-65 ½-66 ¾-67 ½-68 ¾-69 ½-70 ¾-71 ½-72 ¾-73 ½-74 ¾-75 ½-76 ¾-77 ½-78 ¾-79 ½-80 ¾-81 ½-82 ¾-83 ½-84 ¾-85 ½-86 ¾-87 ½-88 ¾-89 ½-90 ¾-91 ½-92 ¾-93 ½-94 ¾-95 ½-96 ¾-97 ½-98 ¾-99 ½-100 ¾-101 ½-102 ¾-103 ½-104 ¾-105 ½-106 ¾-107 ½-108 ¾-109 ½-1010 ¾-1011 ½-1012 ¾-1013 ½-1014 ¾-1015 ½-1016 ¾-1017 ½-1018 ¾-1019 ½-1020 ¾-1021 ½-1022 ¾-1023 ½-1024 ¾-1025 ½-1026 ¾-1027 ½-1028 ¾-1029 ½-1030 ¾-1031 ½-1032 ¾-1033 ½-1034 ¾-1035 ½-1036 ¾-1037 ½-1038 ¾-1039 ½-1040 ¾-1041 ½-1042 ¾-1043 ½-1044 ¾-1045 ½-1046 ¾-1047 ½-1048 ¾-1049 ½-1050 ¾-1051 ½-1052 ¾-1053 ½-1054 ¾-1055 ½-1056 ¾-1057 ½-1058 ¾-1059 ½-1060 ¾-1061 ½-1062 ¾-1063 ½-1064 ¾-1065 ½-1066 ¾-1067 ½-1068 ¾-1069 ½-1070 ¾-1071 ½-1072 ¾-1073 ½-1074 ¾-1075 ½-1076 ¾-1077 ½-1078 ¾-1079 ½-1080 ¾-1081 ½-1082 ¾-1083 ½-1084 ¾-1085 ½-1086 ¾-1087 ½-1088 ¾-1089 ½-1090 ¾-1091 ½-1092 ¾-1093 ½-1094 ¾-1095 ½-1096 ¾-1097 ½-1098 ¾-1099 ½-10100 ¾-10101 ½-10102 ¾-10103 ½-10104 ¾-10105 ½-10106 ¾-10107 ½-10108 ¾-10109 ½-10110 ¾-10111 ½-10112 ¾-10113 ½-10114 ¾-10115 ½-10116 ¾-10117 ½-10118 ¾-10119 ½-10120 ¾-10121 ½-10122 ¾-10123 ½-10124 ¾-10125 ½-10126 ¾-10127 ½-10128 ¾-10129 ½-10130 ¾-10131 ½-10132 ¾-10133 ½-10134 ¾-10135 ½-10136 ¾-10137 ½-10138 ¾-10139 ½-10140 ¾-10141 ½-10142 ¾-10143 ½-10144 ¾-10145 ½-10146 ¾-10147 ½-10148 ¾-10149 ½-10150 ¾-10151 ½-10152 ¾-10153 ½-10154 ¾-10155 ½-10156 ¾-10157 ½-10158 ¾-10159 ½-10160 ¾-10161 ½-10162 ¾-10163 ½-10164 ¾-10165 ½-10166 ¾-10167 ½-10168 ¾-10169 ½-10170 ¾-10171 ½-10172 ¾-10173 ½-10174 ¾-10175 ½-10176 ¾-10177 ½-10178 ¾-10179 ½-10180 ¾-10181 ½-10182 ¾-10183 ½-10184 ¾-10185 ½-10186 ¾-10187 ½-10188 ¾-10189 ½-10190 ¾-10191 ½-10192 ¾-10193 ½-10194 ¾-10195 ½-10196 ¾-10197 ½-10198 ¾-10199 ½-10100 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Cross-Cut Saw Handles—

Atkins' No. 1 Loop, $\frac{1}{2}$ pair, 30¢; No. 3, 22¢; No. 2 and No. 4 Reversible, 22¢; Baynton's Loop Saw Handles, 50¢ 60¢ Champion 15¢

Hangers—

Barn Door, old patterns 60¢ & 10¢ & 10¢ & 20¢ Barn Door, New England 60¢ & 10¢ & 10¢ & 20¢ Samson Steel Anti-Friction 55¢ Orleans Steel 55¢ Hamilton Wrought Wood Track 55¢ U. S. Wood Track 65¢ Champion 60¢ & 10¢ Rider and Wooster, Medina Mfg. Co.'s List 70¢ Climax Anti-Friction 60¢ Climax Anti-Friction for Wood Track 55¢ Zenith for Wood Track 55¢ Reed's Steel Arms 60¢ Challenge, Barn Door 50¢ Stedman's Improved (Anti-Friction) 55¢ & 10¢ Victor, No. 1, \$15.00; No. 2, \$16.50; No. 3, \$18.00 Kidder's 50¢ & 10¢ The Boss 60¢ & 10¢ Best Anti-Friction 60¢ & 10¢ Duplex (Wood Track) 60¢ & 10¢ Terry's Pat., $\frac{1}{2}$ doz pr. 4 in., \$10.00; 5 in., \$12.00 50¢ & 50¢ & 10¢ Cronk's Pat., No. 4, \$12.00; No. 5, \$14.40; No. 6, \$18.00 50¢ & 15¢ & 20¢ Wood Track Iron Clad, $\frac{1}{2}$ ft. 10¢ 50¢ & 15¢ & 20¢ Carrier Steel Anti-Friction 50¢ & 50¢ Architect, $\frac{1}{2}$ set \$6.00 20¢ Eclipse 20¢ & 10¢ Felix, $\frac{1}{2}$ set \$4.50 20¢ Richards' 30¢ & 30¢ & 10¢ Lane's Anti-Friction 40¢ & 10¢ Ball Bearing Door Hanger, 20¢ & 10¢ & 25¢ & 10¢ Warner's Pat. 20¢ & 20¢ & 10¢ Stearns' Anti-Friction 20¢ & 20¢ Stearns' Challenge 25¢ & 10¢ & 25¢ & 10¢ Faultless 40¢ & 40¢ & 5¢ American, $\frac{1}{2}$ set \$6.00 20¢ Rider & Wooster, No. 1, 62¢; No. 2, 75¢ Paragon, Nos. 1, 2 and 3 40¢ & 10¢ Paragon, Nos. 5, 6, 7 and 8 20¢ & 10¢ Crescent 60¢ & 60¢ Nickel, Cast Iron 50¢ Nickel, Malleable Iron and Steel 40¢ Scranton Anti-Friction Single Strap 33¢ & 5¢ Scranton Anti-Friction Double Strap 40¢ Universal Anti-Friction 40¢ Wild West, 4 in. Wheel, \$15.00; 5 in. Wheel, \$21.00 45¢ Star 40¢ & 10¢ & 40¢ & 10¢ & 5¢ May 50¢ & 50¢ & 10¢ Barry, \$6.00 40¢ & 10¢

Harness Snaps—

See Snaps.

Hatchets—

List Jan. 1, 1886.

Isaac Blood 35¢ & 40¢ Hunt's Shingling, Lath and Claw 40¢ & 50¢ His' Blood 40¢ Buffet Hammer Co. 40¢ & 10¢ & 50¢ Hurd's 40¢ & 10¢ & 50¢ Fayette R. Plum. 40¢ & 10¢ Wm. Mann, Jr., & Co. 50¢ & 50¢ Underhill Edge Tool Co. 40¢ & 50¢ & 10¢ Underhill's, Haines and Bright 33¢ & 5¢ C. Hammond & Son 40¢ & 10¢ & 50¢ Simmons' 40¢ & 10¢ & 40¢ & 10¢ Peck's 40¢ & 10¢ & 40¢ & 10¢ Kelly's 50¢ & 50¢ & 5¢ Sargent & Co. 50¢ Ten Eyck Edge Tool Co. 40¢ & 10¢ & 40¢ & 50¢ Collins 10¢

*Hay and Straw Knives—*Lightning, Mfrs', price $\frac{1}{2}$ doz \$18.00, 25¢

But jobbers frequently give extras.

Gem $\frac{1}{2}$ doz \$10 Wadsworth's 40¢ & 75¢ & 10¢ & 10¢ Carter's Needle $\frac{1}{2}$ doz \$11.50 & \$12.00 Heath's $\frac{1}{2}$ doz \$13.50 & \$14.00 Auburn Hay, Com. and Spear Point 50¢ Auburn, Straw 40¢*Hinges—*

Wrought Iron Hinges

Strap and T. 75¢ & 75¢ & 5¢

Screw Hook and Strap 6 to 12 in., $\frac{1}{2}$ lb 34¢Heavy Welded Hook 12 to 20 in., $\frac{1}{2}$ lb 34¢Screw Hook $\frac{1}{4}$ in., $\frac{1}{2}$ doz \$1.50 24¢Screw Hook and Eye $\frac{1}{4}$ in., $\frac{1}{2}$ doz \$3.80 30¢

Rolled Blind Hinges, Nos. 22 and 34 50¢ & 10¢

Rolled Blind Hinges, Nos. 232 and 24 55¢ & 10¢

Rolled Plate 70¢ & 10¢

Rolled Raised 70¢ & 10¢

Plate Hinges, 8, 10 & 12 in., $\frac{1}{2}$ lb 55¢"Providence" over 12 in., $\frac{1}{2}$ lb 45¢

Spring Hinges—

Geer's Spring and Blank Butts 40¢

Union Spring Hinge Co.'s list, March, 1886 20¢

Acme and U. S. Empire and Crown 30¢

Hero and Monarch 50¢

American, Gem, and Star, Japanned 20¢

American, Gem, and Star, Bronzed net

Oxford, Bronze and Brass net

Barker's Double Acting 20¢ & 10¢

Union Mfg. Co. 25¢

Bommer's 30¢

Buckman's 15¢ & 20¢

Chicago 30¢

Wiles' 10¢

Devore's 40¢

Rex 40¢

Gate Hinges—

Western $\frac{1}{2}$ doz \$4.40, 60¢N. E. $\frac{1}{2}$ doz \$7.00, 55¢N. E. Reversible $\frac{1}{2}$ doz \$5.20, 50¢ & 10¢

Clark's, No. 1, 2, 3 60¢ & 10¢ & 5¢

N. Y. State $\frac{1}{2}$ doz \$5.00, 55¢ & 10¢Automatic $\frac{1}{2}$ doz \$12.00, 50¢Common Sense $\frac{1}{2}$ doz pair \$4.50, 50¢

Seymour's 45¢ & 10¢

Shepard's 60¢ & 10¢ & 5¢

Reed's Latch and Hinges $\frac{1}{2}$ doz \$12.00, 50¢

Blind Hinges—

Parker 75¢ & 25¢

Palmer 50¢ & 5¢ & 10¢

Seymour 70¢ & 25¢

Nicholson 45¢ & 10¢

Huffer 50¢

Clark's, Nos. 1, 3, 5, 40 and 50 75¢ & 10¢ & 5¢ & 80¢

Claire's Mortise Gravity 50¢ New Haven 28¢ & 26¢ 24¢ 23¢ 25¢ & 10¢ & 25¢ & 10¢ & 10¢ Saranac 23¢ 21¢ 19¢ 18¢ 30¢ & 10¢ Champion 25¢ 23¢ 22¢ 21¢ 20¢ 10¢ & 10¢ Capewell 28¢ 26¢ 25¢ 24¢ 23¢ 35¢ & 25¢ & 10¢ Star 23¢ 21¢ 20¢ 19¢ 18¢ 10¢ & 10¢ & 12¢ Anchor 23¢ 21¢ 20¢ 19¢ 18¢ 35¢ Western 23¢ 21¢ 20¢ 19¢ 18¢ 40¢ & 10¢ Empire Bronzed 14¢ $\frac{1}{2}$ in.

Ventilator Cord, Samson Braided, White or Drab Cot $\frac{1}{2}$ doz \$7.50, 20¢*Locks, &c.—*

Door Locks, Latches, &c.

List Dec. 30, '88, chgd Feb. 2, '87 50¢ & 10¢ & 60¢ & 5¢

Mallory, Wheeler & Co., list July, '88 50¢ & 10¢ & 60¢

Sargent & Co., list Aug. 1, '88 55¢ & 2¢

Reading Hardware Co., list Feb. 2, '88 55¢ & 60¢ & 10¢

Livingston & Co 70¢

Note.—Lower net prices often made.

Pentron's Burglar Proof 60¢ & 25¢

Plate 33¢ & 2¢

F. Many's "Extension Cylinder" \$10.50

F. doz

Barney Mfg. Co 40¢ & 10¢ & 10¢

Lane Corrugated Key 33¢ & 5¢

Deitz Flat Key 30¢

L. & C. Round Key Latches 30¢ & 10¢

L. & C. Flat Key Latches 33¢ & 10¢

Romer's Night Latches 15¢

Yale, new list 33¢ & 5¢

Shepardson or U. S. Felter or American 40¢ & 10¢

Seed's N. Y. Hasp Lock 25¢

Cabinet—

Eagle, Gaylord Parlor Cabinet Corbin List March, '84, rev. Jan. 1, '85 33¢ & 2¢

Deitz, Nos. 36 to 39 40¢

Deitz, Nos. 51 to 63 40¢ & 10¢

Deitz, Nos. 86 to 96 30¢

Stoddard Lock Co 30¢ & 33¢ & 5¢

"Champion" Night Latches 40¢

Barnes Mfg. Co 40¢ & 10¢ & 10¢

Eagle and Corbin Trunk 25¢ & 2¢

"Champion" Cab. and Combination 33¢ & 5¢

Yale 33¢ & 5¢

Romer's 25¢

Padlocks—

List Dec. 23, '84 75¢ & 10¢

Yale Lock Mfg. Co.'s 33¢ & 5¢

Eagle 25¢ & 2¢

Eureka, Eagle Lock Co 40¢ & 2¢

Romer's, Nos. 0 to 91 30¢

Romer's Scandinavian, &c., Nos. 100 to 150 50¢ 15¢

A. E. Deitz 40¢

Champion Padlocks 40¢

Hotchkiss 30¢

Star 40¢

Horseshoe 40¢ & 10¢ & 10¢

Barnes Mfg. Co 40¢ & 10¢ & 10¢

Rock's 30¢

Brown's Pat. 25¢

Scandinavian 90¢ & 90¢ & 10¢

Fram's Pat. Scandinavian low list 60¢

Ames Sword Co. up to No. 150 40¢

Ames Sword Co. above No. 150 50¢

Jack Screws—

See Hollow-Ware.

Kettles—

Spun, Stamped.

Brass, 7 to 17 in., $\frac{1}{2}$ in. 24¢ 21¢Brass larger than 17 in., $\frac{1}{2}$ in. 26¢ 23¢ & 6¢

Enamelled and Tea Kettles.

See Hollow-Ware.

Keys—

Lock Asso'n list Dec. 30, 1886 50¢ & 10¢

60¢ & 5¢

Eagle, Cabinet, &c. 33¢ & 2¢

Hotchkiss' Brass Blanks 40¢

Hotchkiss' Copper and Tinned 40¢

Hotchkiss' Pat. and Cab. 35¢

Ratchet Bed Keys 40¢ & 10¢ & 15¢

50¢ & 10¢

Pike 40¢

Pike Poles, Pike & Hook 12 ft. 11.50; 14 ft. 12.50; 16 ft. 14.50;

18 ft. 17.50; 20 ft. 21.50.

Pike Poles, Pike only, $\frac{1}{2}$ in. 12 ft. 10.00; 14 ft. 11.00; 16 ft. 13.00; 18 ft. 14.00; 20 ft. 15.00; 22 ft. 16.00.Pike Poles, not ironed, $\frac{1}{2}$ in. 12 ft. 6.00; 14 ft. 7.00; 16 ft. 8.00; 18 ft. 9.00; 20 ft. 10.00; 22 ft. 11.00; 24 ft. 12.00; 26 ft. 13.00.Setting Poles, $\frac{1}{2}$ in. 12 ft. 8.00; 14 ft. 11.00; 16 ft. 13.00; 18 ft. 15.00; 20 ft. 17.00.

Swamp Hooks 18¢

Hand Spikes 12¢

Ring Peavies, "Blue Line" 20¢

Ring Peavies, Common 18¢

Steel Socket Peavies 21¢

Mail, Iron Socket Peavies 19¢

Cant Hooks, "Blue Line" 16¢

Cant Hooks, Common Finish 14¢

Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish 14¢

Cant Hooks, Mall. Socket Clasp, Common Finish 16¢

Cant Hooks, Clip Clasp, "Blue Line" Finish 14¢

Cant Hooks, Clip Clasp, Common Finish 14¢

Hand Spikes 12¢

Pike Poles, Pike & Hook 12 ft. 11.50; 14 ft. 12.50; 16 ft. 14.50;

18 ft. 17.50; 20 ft. 21.50.

Pike Poles, Pike only, $\frac{1}{2}$ in. 12 ft. 10.00; 14 ft. 11.00; 16 ft. 13.00; 18 ft. 14.00; 20 ft. 15.00; 22 ft. 17.00.

Swamp Hooks 18¢

Lustro—

Four-ounce Bottles 1.75¢ $\frac{1}{2}$ gross \$17.00

Mallets—

Hickory 20¢ & 10¢ & 10¢ & 10¢

Lignumvitae 20¢ & 10¢ & 10¢ & 10¢

B. & L. Block Co., Hickory & L. V. 30¢ & 30¢ & 10¢

Match Safes—

Dangerfield's Self-Igniting 1.50¢

CURRENT METAL PRICES.

FEBRUARY 27, 1889.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

IRON AND STEEL.		Sheet and Bolt.									
Bar Iron from Store.		Prices adopted by the Association of Copper Manufacturers of the United States, December 10, 1887, being quotations for all sized lots.									
Common Iron:											
$\frac{3}{4}$ to 2 in. round and square..	1 lb. 1.90 @ ...										
1 to 6 in. x $\frac{3}{4}$ to 1 in.....	1 lb. 2.00 @ 2.10										
Refined Iron:											
$\frac{3}{4}$ to 2 in. round and square..	1 lb. 2.00 @ 2.10										
1 to 4 in. x $\frac{3}{4}$ to $\frac{1}{2}$ in.....	1 lb. 2.20 @ 2.30										
Rods— $\frac{3}{4}$ and 1-16 round and sq..	1 lb. 2.10 @ 2.20										
Bands—1 to 6 x 3-16 to No. 12.	1 lb. 2.20 @ 2.30										
"Burden Best" Iron, base price..	1 lb. 3.00 @ ...										
Burden's "H. B. & S." Iron, base price.....	1 lb. 2.80 @ ...										
"Ulster"	1 lb. 3.10 @ ...										
Norway Rods.....	4.00 @ 5.00										
Merchant Steel from Store.		Per pound.									
Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots.....	2 1/4										
Best Cast Steel, base price in small lots.....	8 1/2										
Best Cast Steel Machinery, base price in small lots.....	5 1/2										
Sheet Iron from Store.											
Common American. R. G. Cleaned.											
10 to 16....1 lb. 2.75 @ 2.80	3.25 @ ...										
17 to 20....1 lb. 2.85 @ 3.00	3.25 @ 3.50										
21 to 24....1 lb. 3.00 @ 3.10	3.50 @ ...										
25 and 30....1 lb. 3.20 @ ...	3.50 @ ...										
27....1 lb. 3.25 @ 3.37	3.75 @ ...										
28....1 lb. 3.50 @ ...	4.00 @ ...										
B. B.		2d qual.									
Galv'd, 14 to 20....1 lb. 4.50 @ ...	4.25 @ ...										
Galv'd, 1 to 24....1 lb. 4.87 1/2 @ ...	4.75 @ ...										
Galv'd, 25 to 26....1 lb. 5.25 @ ...	5.12 @ ...										
Galv'd, 27....1 lb. 5.62 1/2 @ ...	5.48 @ ...										
Galv'd, 28....1 lb. 6.00 @ ...	5.85 @ ...										
Patent Planished.....	1 lb. 10 @ ...										
Russia.....	1 lb. 9 1/2 @ 10										
American Cold Rolled B. B.....	1 lb. 5 @ 7 1/2										
English Steel from Store.											
Best Cast.....	1 lb. 15 @ ...										
Extra Cast.....	1 lb. 16 1/2 @ 17										
Swaged, Cast.....	1 lb. 16 @ ...										
Best Double Shear.....	1 lb. 15 @ ...										
Blister, 1st quality.....	1 lb. 12 1/2 @ ...										
German Steel, Best, 2d quality.....	1 lb. 10 @ ...										
3d quality.....	1 lb. 9 @ ...										
Sheet Cast Steel, 1st quality.....	1 lb. 15 @ ...										
2d quality.....	1 lb. 14 @ ...										
3d quality.....	1 lb. 12 1/2 @ ...										
METALS.											
Tin.	Per lb.										
Banca, Pigs.....	23 1/2										
Straits, Pigs.....	23										
English, Pigs.....	23 1/2										
Straits in Bars.....	24										
Tin Plates.											
Charcoal Plates.—Bright. Per box.											
Melyn Grade.....	1C. 10 x 14.. \$5.75 @ \$6.00										
	1C. 12 x 12.. 6.00 @ 6.25										
	1C. 14 x 20.. 5.75 @ 6.00										
	1C. 20 x 28.. 12.00 @ 12.50										
	IX. 10 x 14.. 7.25 @ 7.50										
	IX. 12 x 12.. 7.50 @ 7.75										
	IX. 14 x 20.. 7.25 @ 7.50										
	IX. 20 x 28.. 15.00 @ 15.50										
	DC. 12 1/2 x 17.. 5.50 @ 5.75										
	DX. 12 1/2 x 17.. 7.00 @ 7.25										
Call and Grade.....	1C. 10 x 14.. 5.75 @ 6.00										
	1C. 12 x 12.. 6.00 @ 6.25										
	1C. 14 x 20.. 5.75 @ 6.00										
	IX. 10 x 14.. 7.25 @ 7.50										
	IX. 12 x 12.. 7.50 @ 7.75										
Allaway Grade.....	1C. 10 x 14.. 5.00 @ 5.12 1/2										
	1C. 12 x 12.. 5.00 @ 5.12 1/2										
	IC. 20 x 28.. 11.00 @ 11.37 1/2										
	IX. 10 x 14.. 6.00 @ 6.25										
	IX. 20 x 28.. 12.00 @ 12.50										
	DC. 12 1/2 x 17.. 4.75 @ 5.00										
	IX. 14 x 20.. 5.25 @ 5.50										
	IX. 20 x 28.. 10.50 @ 10.80										
Coke Plates.—Bright.											
Steel Coke.—IC. 10 x 14, 14 x 20.. \$4.75	\$5.00										
	10 x 20.. 7.25 @ 7.50										
	20 x 28.. 9.75 @ 10.25										
IX. 10 x 14, 14 x 20.. 5.50 @ 5.75											
IX. 12 x 12.. 5.25 @ 5.50											